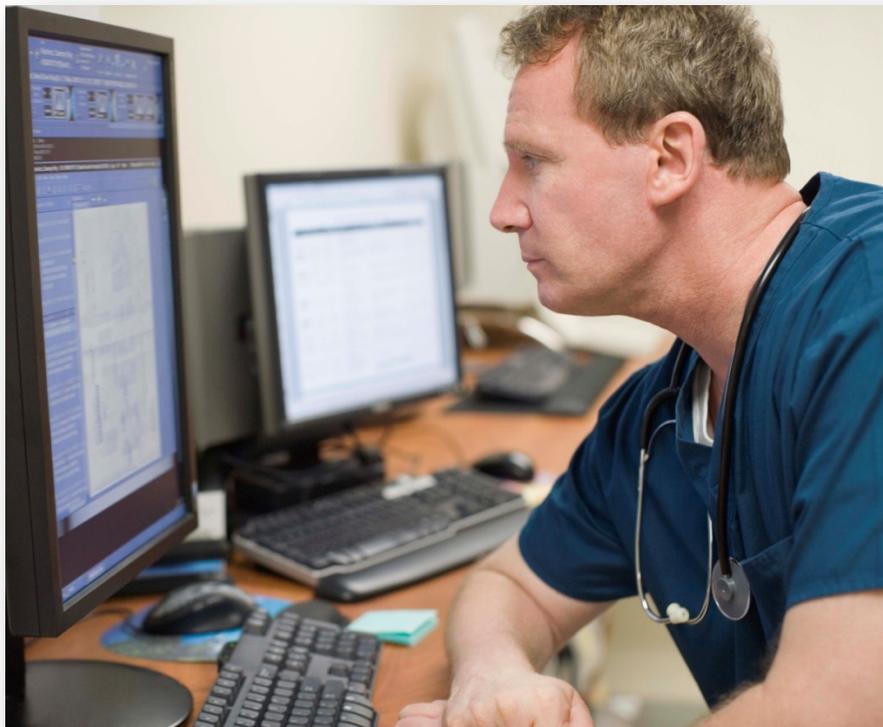




Measure Authoring Tool User Guide



MAT v4.6.0
Updated 9/27/2016

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Preface

The Measure Authoring Tool (MAT) is a web application which allows measure developers to author electronic Clinical Quality Measures (eCQMs) using the Quality Data Model. The MAT provides the capability to express complex measure logic and export measures in several formats, including a human-readable document which can be viewed in a web browser, the fundamental green eCQM XML syntax (SimpleXML), and an eCQM HQMF XML document for integration into Electronic Health Records (EHRs).

The purpose of this document is to provide a description of the functionality of the MAT, and to provide MAT users with step by step instructions for authoring an eMeasure using the MAT.

The Centers for Medicare & Medicaid Services (CMS) has ownership of the MAT. Health Care Innovation Services (HCIS), a joint venture between Telligen and Net-Integrated Consulting (NIC), is currently under contract with CMS for the ongoing development, maintenance, and support of the MAT.

For additional information, contact:

The MAT Help Desk

1776 West Lakes Parkway

West Des Moines, IA 50266

Phone: 1-800-673-0655

Support@emeasuretool.org

Accessibility

The Measure Authoring Tool (MAT) and associated functions is accessible via assistive technology. For an alternative means of accessing information about the MAT, please contact the MAT Help Desk at support@emeasuretool.org. When submitting an email request, provide details about the issue, the web address of the requested information, and your contact information.

I. SECTION 508: EIT ACCESSIBILITY

CMS is committed to making website and electronic information technology (EIT) accessible. In keeping with this goal, CMS implements the regulations of Section 508 of the Rehabilitation Act.

A. Synopsis of Section 508 Accessibility Requirements

Section 508 of the Rehabilitation Act of 1973, as amended by the Workforce Investment Act of 1998, requires Federal agencies ensure Federal employees and members of the public with disabilities have access to and use of information and data that is comparable to individuals without disabilities.

The first regulation implementing Section 508 was issued by the Architectural and Transportation Barriers Compliance Board (the "Access Board"), an independent Federal agency whose primary mission is to promote accessibility for individuals with disabilities. This regulation is referred to as the Access Board's EIT Accessibility Standards, enforceable on June 21, 2001. In January 2005, the Secretary of the Department of Health and Human Services (HHS) signed the HHS Policy for Section 508 Electronic and Information Technology (EIT). This policy establishes guidance for implementing Section 508 compliance throughout the department.

Although Federal agencies have an explicit statutory obligation to make all EIT that they develop, procure, maintain, or use compliant with Section 508, individuals may only file complaints or lawsuits to enforce Section 508's requirements with respect to EIT systems procured or deployed on or after June 21, 2001. The Section 508 requirements do not apply retroactively to pre-existing EIT. However, as agencies upgrade and change their EIT, they must comply with the standards. Specifically, the Electronic and Information Technology Accessibility Standards: Economic Assessment states: "The standards are to be applied prospectively and do not require Federal agencies to retrofit existing electronic and information technology. As agencies upgrade and change their electronic and information technology, they must comply with the standards."

Federal agencies, however, have additional responsibilities under Section 501 and Section 504 of the Rehabilitation Act. These sections require that agencies provide reasonable accommodation to employees with disabilities and program access to members of the public with disabilities and take other actions necessary to prevent discrimination on the basis of disability in their programs.

B. Measure Composer Accessibility

For users of screen reader or other accessibility tools who require an alternate method to use the MAT, contact the MAT Help Desk to arrange a time for a representative to assist you. The phone number for the MAT Help Desk is 1-800-673-0655, and the email address is, support@emeasuretool.org.

II. ADOBE PDF

Some of our documents are available in PDF format. The current version of Adobe Reader, formerly called Acrobat Reader, now includes a built-in Read Out Loud option. If your current version of Adobe Reader does not have this feature, the updated version is available free from Adobe. To install the latest version of the Adobe Reader, go to: <http://www.get.adobe.com/reader>.

Adobe Reader synthesizes the text in Adobe PDF files into speech, using the default speech engine in a regular Windows or Macintosh computer, so anyone can read basic Adobe PDF text files aloud, even without a screen reader. For more information about this new feature, please visit the Adobe Reader Help Accessibility Features web page, <http://helpx.adobe.com/reader/using/accessibility-features.html>.

You can access the Adobe Reader Read Out Loud option in the MAT User Guide by using the following key board shortcuts (toggle on and off with the same command):

Activate / deactivate the Read Out Loud Option: Shift + Ctrl + Y

Read / stop reading the current page only: Shift + Ctrl + V

Read / stop reading the entire document: Shift + Ctrl + B

If you use screen reader software that is not compatible with Adobe Reader (for example, an audio-enabled web browser), Adobe provides a free online tool which converts the content of PDF files to a format most screen reader applications can understand. If you need assistance converting PDF documents, Adobe offers conversion tools at its Accessibility Resource Center at <http://www.adobe.com/accessibility/index.html>.

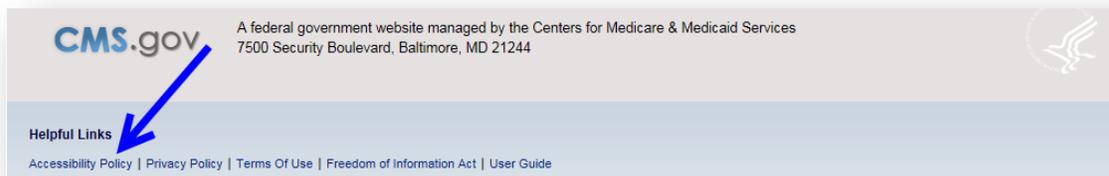
III. EXCEL VIEWER

Several of our documents are available in Microsoft Excel format. The Microsoft Excel Viewer may be required to view and print the Excel files. To install the latest version of Excel Viewer, go to the Excel Viewer Download at <http://www.microsoft.com/download/en/details.aspx?id=10>.

IV. MEASURE AUTHORIZING TOOL ACCESSIBILITY POLICY

The MAT Accessibility Policy link is located at the bottom of each page in the MAT and opens Accessibility Policy in a new window.

Figure 1 Accessibility Policy Link



Chapter 1: Introduction

Chapter Overview: This chapter introduces the importance of quality measures in improving healthcare performance and outcomes. Users will learn how the Quality Data Model (QDM) is used for structuring quality measures consistently for electronic measures, or eMeasures, including those created in the Measure Authoring Tool (MAT).

I. THE BASICS OF MEASURES

Performance measurement and reporting provide a way to assess and understand specific healthcare behaviors, care delivery protocols, and related outcomes by comparing peer-reviewed and tested standards. Measurement also drives quality improvement, influences payment and related policies, and enables consumers and providers to make educated healthcare decisions.¹

Measures are developed by a variety of different healthcare stakeholders, including professional specialty societies, individual provider organizations, accrediting bodies and organizations, organizations focused on quality improvement, as well as Federal, State, and local governments.

Once measures are developed, they often are submitted for endorsement to the National Quality Forum (NQF), viewed as the standard in the industry. The NQF endorsement process reflects a rigorous scientific and evidence-based review with extensive requirements, including those related to scientific acceptability of measure properties, availability and type of supporting evidence, measure usability and feasibility, readiness for public reporting, and comparison to related or competing measures.²

II. MOVING TOWARD ELECTRONIC MEASURES AND THE MEASURE AUTHORING TOOL

Historically, most performance measures have been developed and made available in a paper-based format.

Many are based entirely on claims data; some are “clinically enriched” by incorporating laboratory or pharmaceutical transactions. Organizations implementing measures typically abstract clinical information from patient records manually and merge this information with administrative data to evaluate their performance, compare outcomes, and report to external entities. This has been a laborious and time-consuming process, generally requiring specially trained clinicians to abstract chart information manually.

¹ National Quality Forum (NQF), *The Difference a Good Measure Can Make*, Washington, DC: NQF; 2011. Available at, http://www.qualityforum.org/Measuring_Performance/ABCs/The_Difference_a_Good_Measure_Can_Make.aspx. Last accessed November 2011.

² NQF, *What NQF Endorsement Means*, Washington, DC: NQF; 2011. Available at, http://www.qualityforum.org/Measuring_Performance/ABCs/What_NQF_Endorsement_Means.aspx. Last accessed November 2011.

To allow providers to take advantage of their Electronic Health Records (EHRs) for performance measurement, measure requirements need to be created in a format that clinical IT systems can read. In 2009, HHS, motivated by The Health Information Technology for Economic and Clinical Health (HITECH) Act,³ requested the retooling of 113 NQF-endorsed[®] measures from traditional paper-based measures to electronic measures, or eMeasures, to be compatible with or readable by EHR systems.

Under contract with the National Quality Forum, a Beta version of the Measure Authoring Tool (MAT) was initially developed and released in January 2011. The basic version of the tool was released in September 2011, followed by the enhanced version in January 2012. Effective January 2013, the MAT contract was transitioned from NQF to the CMS. This transition allows for greater coordination of efforts to evolve eCQM standards. The MAT plays a key role in the future success of eCQMs.

In November 2013, the MAT integrated with the Value Set Authority Center (VSAC). The VSAC is provided by the National Library of Medicine (NLM) in collaboration with the Office of the National Coordinator for Health Information Technology (ONC) and CMS. The VSAC is the sole repository for official versions of value sets. Rigorous review standards are implemented to ensure the validity and accuracy of value sets used within eCQMs. With this integration, the functions of authoring, maintenance, and storage of value sets were removed from the MAT. The MAT/VSAC integration provides MAT users with a means for retrieval of value sets from VSAC for use in building measure logic.

Standardizing the measure format and content using eMeasures helps ensure that performance measures are consistently defined, implemented, and compatible across EHRs and other clinical IT systems. This standardization will make performance measurement more accurate and cost-effective and less burdensome for providers, and will facilitate comparison across settings and conditions.

In the future, eMeasures will be essential to a more efficient electronic healthcare environment because they enable:

- greater standardization and comparability across measures;
- more precision; and
- better care delivery through access to more comparable and accurate performance information.

The Measure Authoring Tool (MAT) is the first tool of its kind to offer the measurement community a web-based, publicly available, and non-proprietary way to develop eMeasures. The MAT offers measure developers a means to specify and develop quality measures in a streamlined, structured approach and should significantly reduce the time required to create new eMeasures and convert existing paper-based measures to eMeasures.

III. THE QUALITY DATA MODEL (QDM) AND THE MEASURE AUTHORING TOOL

The Quality Data Model (QDM) provides the grammar to express eMeasures. The QDM promotes a shared understanding among stakeholders so they can communicate and interpret quality measures

³ U.S. Congress, Health Information Technology for Economic and Clinical Health (HITECH) Act, Title XIII of Division A and Title IV of Division B of the American Recovery and Reinvestment Act of 2009 (ARRA), Pub. L. No. 111-5 (Feb. 17, 2009). Washington, DC: Government Printing Office (GPO); 2009.
Available at, <http://www.gpo.gov/fdsys/pkg/PLAW-111publ5/pdf/PLAW-111publ5.pdf>. Last accessed November 2011.

consistently in electronic clinical applications. Measure developers using the QDM can consistently describe a quality measure's criteria, allowing for more accurate performance comparison.

The QDM allows eMeasures to specify a greater level of detail and in a more consistent and precise manner than earlier methods of measure expression. The QDM will continue to be updated to support the evolving needs of the measurement field. The MAT uses the QDM to enable measure developers to create eMeasures precisely and consistently that can be used across EHRs and other clinical IT systems.

The MAT is software intended to develop an eMeasure based on measure specifications using the QDM. For the purposes of the MAT and QDM, the following terms are used to describe various healthcare IT concepts:

Value set: A list of specific codes derived from a code system to define an individual data element within a measure; and

Code system: Used in the MAT and in the healthcare field, which is otherwise referred to as Taxonomy in the output of an eMeasure. Examples of code systems are SNOMED-CT, LOINC, and RxNorm.

Each QDM element is composed of a category of information, a datatype (or context of use), and a value set. Each QDM element also may have related attributes (also known as metadata, information about the data element). The category is the type of information addressed by the QDM element (e.g., medication, laboratory test, or condition). The category is the highest level of definition for a QDM element. The data type allows the measure developer to assign a context in which the category of information is expected to exist (e.g., "Medication, Order" vs. "Medication, Dispensed" vs. "Medication, Administered", vs. "Medication, Active"). The value set defines the specific instance of the category by assigning a set of values (or codes). For example, the specific RxNorm codes that identify all aspirin-containing compounds formulated for oral use constitute a value set. Adding the context by applying the datatype "Medication, Active" allows the measure developer to specify the presence of aspirin on the active medication list. An attribute provides additional information about a QDM element. All QDM elements have timing (e.g., time of occurrence, start and/or stop times), and data flow attributes (source or recorder). Other attributes include category-specific attributes. For example, medication attributes include route and dose.

The structure of a QDM element is shown in more detail in [Appendix A](#). This appendix illustrates the relationships among QDM categories, datatypes, and value sets. The QDM Component Matrix ([Appendix B](#)) also lists all possible combinations of QDM categories by datatypes and attributes.

The application of the QDM to eMeasures will become clearer as this User Guide steps through an example measure, titled MAT User Guide Example: Proportion Measure, to guide users through all of the steps to develop an eMeasure using the MAT tools and functionality. The example eMeasure assists MAT users to create their eMeasure by reflecting the most recent QDM ([Quality Data Model v4.2.0 published August 31, 2015](#)).

The human readable export of this measure is viewable in [Appendix D](#). This is not a published measure, nor is it intended to be a published measure.

IV. HOW TO USE THIS USER GUIDE

The user guide is designed for use by beginner-level measure developers and organizations interested in creating measures to evaluate performance. Additionally, the user guide can be accessed from a link in the footer of the MAT or in the footer of the MAT home page, <https://www.emasuretool.cms.gov>. A link to the user guide is also available at the MAT public website on the Training & Resources page.

The goal of the user guide is to:

- Provide a clear picture of the overall purpose of the MAT;
- Provide users with detailed guidelines and instructions on how to use the MAT to build an eMeasure;
- Describe the MAT's features and capabilities, its importance, and how it should be used; and
- Highlight key issues to consider before creating an eMeasure.

Examples of potential uses of the user guide include users seeking clarity on what the MAT is and what it is used for. Questions may include:

- What are the system requirements?
- How do I request a new password?
- What is the relationship between the MAT and eMeasures?
- What is the relationship between the MAT and the VSAC?

Users move tab by tab through the user guide to build an eMeasure. The user guide is organized around each page or tab in the MAT. The narrative, descriptions, and screen shots are intended to provide clarity and detail.

The user guide leads a user through all functions of each tab and is divided by chapter. Below is a layout of the chapters.

[Chapter 5: Integrating with the VSAC](#)— provides background information about the integration of the Measure Authoring Tool and NLM's Value Set Authority Center. Information and instruction about the integration with the VSAC via the MAT are provided in this chapter.

[Chapter 6: Measure Library](#)— describes the features available on the Measure Library page. The Measure Library is the home page from which measures can be added, deleted, selected for editing or updates, or viewing. The Measure Composer allows users to create all of the selected measure's components and logic. A chapter is designated for each tab within Measure Composer. The tabs

available under Measure Composer are Measure Details, QDM Elements, Clause Workspace, Population Workspace, Measure Packager, and Measure Notes.

[Chapter 7: Measure Composer-Measure Details](#)— describes the purpose and features within the Measure Details page. Measure Details let users specify information about the measure (metadata) that appears in the measure header section of the eMeasure.

[Chapter 8: Measure Composer-QDM Elements](#)— describes the features within the QDM Elements page. Within the QDM Elements page, MAT users are able to create QDM elements and attributes. QDM elements and attributes can be created with or without VSAC data. Once applied to a measure, QDM elements and attributes can be modified, removed, copied, and updated with the most current VSAC value set data.

[Chapter 9: Measure Composer-Clause Workspace](#)— describes the features within the Clause Workspace. Within the Clause Workspace, MAT users build logic statements called clauses. Here the clauses may be created, edited, deleted, validated, and stored.

[Chapter 10: Measure Composer-Population Workspace](#)— describes the features and functions of the Population Workspace. MAT users use the Population Workspace to define eMeasure populations by adding and connecting clauses built and stored within the Clause Workspace.

[Chapter 11: Measure Composer-Measure Packager](#)— describes how to use the Measure Packager page to prepare an eMeasure for export. The populations to be included in a measure package are compiled here. MAT users may also add an item count to a specific population, identify an association between populations, or add supplemental data elements, if applicable. After a measure package is completed, the measure is ready for export.

[Chapter 12: Measure Composer-Measure Notes](#)— describes how to use the Measure Notes page features. Within the Measure Notes page, MAT users are able to create and export notes for a selected measure draft or version.

The user guide draws on the sample eMeasure MAT User Guide Example: Proportion Measure to illustrate how to create an eMeasure using the MAT. To view the sample measure in human readable format, please refer to [Appendix D](#).

Notes in the boxed text illustrated below provide navigation tips and walks users to the next step in building a measure.

Navigation Tip: Information provided in these boxes provides tips and clues on next steps a user should take to build an eMeasure.

The next chapter will address system requirements needed to access and use the MAT.

Chapter 2: System Availability and Requirements

Chapter Overview: This chapter lists the minimum hardware and software requirements to access the MAT effectively.

I. HARDWARE

Processing speed: 2GHz (recommended). Less than the recommended processing speed will affect the time it takes to load information or save data.

Memory: 2 GB RAM (minimum requirements).

Screen resolution: 1024 x 768 pixels.

II. SOFTWARE

Internet browsers: Microsoft® Internet Explorer Version 8.0 or 9.0, Firefox 36 or higher. Users may open the MAT with other browsers, but they are not supported at this time.

Operating systems: Microsoft Windows 7 or above. Users may open the MAT in other operating systems, but they are not supported at this time.

III. INTERNET CONNECTION

The MAT is accessible via any high-speed Internet connection (minimum of a 56k modem).

IV. SYSTEM AVAILABILITY

The MAT is available 24 hours a day, 7 days a week at <https://www.emasuretool.cms.gov>. MAT users are notified by email about scheduled and unscheduled system maintenance. Scheduled maintenance occurs on the second weekend of each month from 1:00 AM Eastern Time (ET) on Saturday through 7:00 PM ET on Sunday. The MAT may not be available during those times. A secondary maintenance window is reserved to begin at 8:00 pm ET on Tuesday of each month.

Note: The Value Set Authority Center (VSAC) can operate using additional software (i.e. Google Chrome and Mac OS). The MAT does not support this software, thus MAT software requirements must be met when integrating with the VSAC via the MAT.

Chapter 3: Account Registration and Signing Into the MAT

Chapter Overview: This chapter outlines information a user must provide when setting up an account, the process of setting up an account, the process of signing into the Measure Authoring Tool (MAT), and how to retrieve a forgotten password/User ID. Additional information about system timeouts, help desk, and system maintenance is also included.

There are several required steps to becoming a Measure Authoring Tool (MAT) user. All new MAT users are required to submit a notarized New User Registration Form, obtain UMLS license credentials, and register up to three Symantec™ VIP Access Credential IDs. Instructions for completing these steps are provided next. Once these three steps are completed, MAT users may sign into the MAT. Instructions for signing into the MAT are also provided in this chapter.

I. MAT REGISTRATION PROCESS

A. Submit New User Registration Form

To access the MAT, new MAT users must complete the New User Registration Form, which is located on the Training & Resources tab of the MAT public website, <http://www.emasuretool.cms.gov>. The form should be completed according to the directions listed within the document. The form must be notarized and the original mailed to the Help Desk at the following address:

Telligen
MAT Help Desk
1776 West Lakes Parkway
West Des Moines, IA 50266

In addition to contact information, applicants will also need to provide the organization's object identifier (OID). If the applicant's organization has a registered OID, the applicant is to use that OID. If the organization does not have an OID, the applicant may choose to register for an OID using the HL7 OID Registry at, <http://www.hl7.org/oid/index.cfm>.

The organization name and OID used within the MAT must be consistent with other MAT users who are using the same organization name. For example, if an organization is called Measure Developer, Inc. and the OID for this organization is 1.2.3.4.5.6, all registration applicants who list Measure Developer, Inc. as their organization must use the OID 1.2.3.4.5.6. Otherwise a different organization name must be used.

If your organization does not have a registered OID, and a registered OID is not required for your measure development purposes, you may submit a request to the [MAT Help Desk](#) to assign a universally unique identifier (UUID) for your organization in lieu of an OID.

B. Apply for UMLS License

To integrate with the Value Set Authority Center (VSAC) through the MAT, users are required to have a Unified Medical Language System© Metathesaurus License (UMLS).

To request a license and create a UMLS account, users must access <https://uts.nlm.nih.gov/license.html>.

C. Set Up Symantec™ VIP Access

The MAT uses two-factor authentication. Two-factor authentication requires that two unique identifiers be provided to access an application. When logging into the MAT, you are required to enter a MAT User ID, password (unique identifier 1) and Symantec™ security code(unique identifier 2). The MAT uses an application produced Symantec™ Validation & ID Protection called Symantec™ VIP Access. The Symantec™ security code is generated from an installed application to your desktop, smartphone, or tablet. Complete instructions for installing Symantec™ VIP Access and registering the corresponding Symantec™ Credential ID are located on the Training & Resources page of the public website in the document titled [Symantec™ VIP Access Setup](#).

The MAT supports up to three installations of Symantec™ VIP Access. Symantec VIP Access installation instructions for mobile devices and desktops can be accessed online at the [Symantec Validation & ID Protection Center](#). Once the Symantec™ VIP Access application is installed, register the corresponding 12-digit alphanumeric Symantec™ Credential ID with the MAT Help Desk by completing the [Contact Us](#) form on the public website or call 1-800-673-0655.

Note: The Symantec™ VIP Access application does not need to be installed on the same device or computer being used to access the MAT. For example, a work-issued laptop or desktop can be used to access the MAT, and the Symantec VIP Access application producing the Symantec™ Security Code may be installed on a separate device such as a smartphone.

After the Symantec™ Credential ID(s) are registered with the MAT Help Desk, the security code generated by one of the registered Symantec™ VIP Access installations may be entered to access the MAT. Symantec™ security codes are new every 30 seconds. The installed application includes a timer indicating when the security code will update. Desktop applications include a copy function to ensure the correct security code is entered into the MAT.

Note: A unique Symantec™ Credential ID is assigned with each installation of Symantec™ VIP Access. The assigned Credential ID must be registered once with the MAT Help Desk and does not change. The Symantec Security Code changes every 30 seconds, and the most recently generated security code is entered with every log in attempt to the MAT.

Figure 2 Symantec™ VIP Access for Windows PC



D. MAT User ID

After Symantec™ VIP Access Credential ID(s) are received by the MAT Help Desk, an email notification with the assigned MAT User ID is generated. The MAT User ID is the first two letters of the MAT user's first name, the next six letters of the last name, and four randomly assigned numbers. For example, a new MAT user with the name Evelyn Johnson might be given the MAT User ID EvJohnso5983.

E. Password

At the same time the MAT User ID is generated, a separate email notification containing a temporary password is generated. The temporary password is used for the initial sign-in. Unused, temporary passwords expire in 5 days. Please contact the MAT Help Desk by completing the [Contact Us form](#) on the Contact Us page of the public website, <https://www.emasuretool.cms.gov>, if your temporary password has expired.

II. SIGNING INTO THE MAT - NEW USER

New MAT users may sign into the MAT after receiving three email notifications.

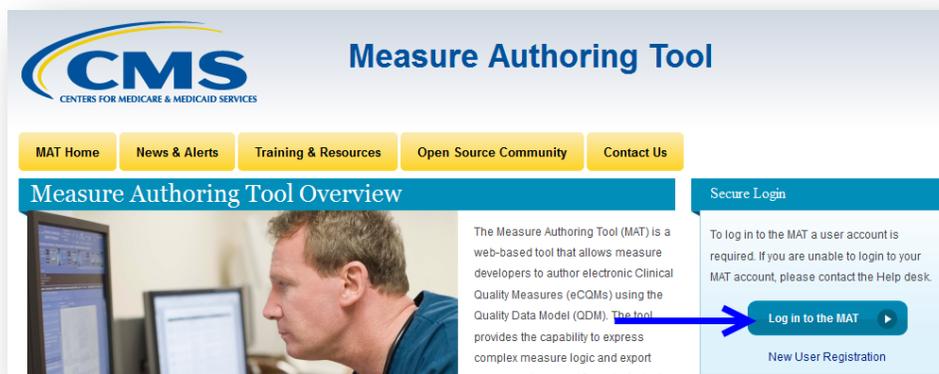
- Email confirmation that at least one Symantec™ Credential ID is registered with the MAT Help Desk.
- Email notification including the MAT User ID.
- Email notification including a temporary password.

Note: Temporary passwords are good for 5 calendar days.

Complete the following steps when accessing the Measure Authoring Tool for the first time.

- 1) Open a supported browser (Internet Explorer and Mozilla Firefox are supported browsers; Safari and Chrome are not supported).
- 2) Go to <https://www.emasuretool.cms.gov>.
- 3) On the MAT Home page select 'Log in to the MAT' under 'Secure Login' ribbon on the upper, right corner.

Figure 3 MAT Homepage



- 4) Enter MAT User ID and temporary Password.

Figure 4 MAT Login - User ID and Password



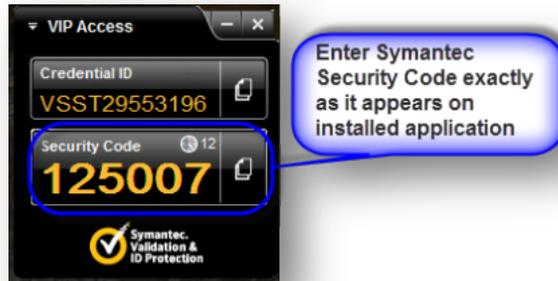
- 5) Now enter the Symantec™ Security Code as it is displayed.

Note: The six-digit Security Code is new every 30 seconds. A timer is displayed in the upper right-hand corner of the Security Code field indicating when a new number will be generated. There is a copy function to the immediate right of the Security Code to ensure the six-digit code is copied accurately and quickly into the MAT Security Code field.

Figure 5 MAT Login - Security Code



Figure 6 Symantec™ VIP Access Application



- 6) After the MAT User ID, password, and security code are entered, click on the yellow Sign In button access the MAT.

Figure 7 MAT Login - Sign In Button

Note: A warning message displays with failed log in attempts. Verify the correct MAT user ID, password, and security code are entered. After three failed attempts, the account will be locked and the user will need to contact the [MAT Help Desk](#).

7) After signing into the MAT with a temporary password, new MAT users are prompted to create and confirm a new password. For security purposes, the system requires a strong password (defined below).

- Passwords must not consist of a single dictionary word with random numbers and symbols.
- Last six (6) passwords cannot be reused.
- Password needs to be at least one day old before it can be changed again.
- Passwords must contain:
 - 8-16 characters in length;
 - An uppercase character;
 - A lowercase character;
 - A numeric character; and
 - One of the following special characters: % * # + - , : = ?

Navigation Tip: MAT passwords expire every 60 days. The new password must continue to meet the strong password requirements. The new password must not match the previously used 6 passwords. After 60 days, MAT users are restricted from accessing the MAT until their MAT password has been changed successfully.

8) Next, select three different security questions and provide answers to those security questions. Answers may not be duplicated.

Figure 8 Change Password and Security Questions

The screenshot shows a web form titled "Initial Sign In" with a blue header. Below the header, it states "All fields are required". The form is divided into two main sections: "Change Password" and "Security Questions & Answers".

Change Password Section:

- Label: "Change Password"
- Field: "New Password" (text input)
- Field: "Confirm New Password" (text input)

Security Questions & Answers Section:

- Section Header: "Security Questions & Answers"
- Question 1: "Security Question 1" (dropdown menu) with the text "What was the make of your first car?"
- Field: "Security Answer 1" (text input)
- Question 2: "Security Question 2" (dropdown menu) with the text "In what city were you born?"
- Field: "Security Answer 2" (text input)
- Question 3: "Security Question 3" (dropdown menu) with the text "What was the name of your first school?"
- Field: "Security Answer 3" (text input)

At the bottom of the form, there are two buttons: a yellow "Submit" button and a grey "Cancel" button.

- 9) Select the yellow Submit button to log into the MAT.
- 10) Users are redirected to the UMLS Account page of the MAT tool and a success message in a green banner displays below the page headings of the tool. In addition, the signed in user’s first name is displayed below the UMLS status in the upper, right corner of the page.

Figure 9 Successful Login to the MAT

The screenshot shows the "Measure Authoring Tool" dashboard. At the top right, there is a "Sign Out" link and a status indicator "UMLS Inactive" with a red dot. Below this, it says "Welcome User's First Name".

The main navigation bar includes "Measure Library", "Measure Composer", "MAT Account", and "UMLS Account" (which is highlighted with a blue bar).

A green banner message reads: "Welcome User's First Name! You have successfully logged into the MAT." Below this banner is the "UMLS Account Login" section, which contains a smaller "Please sign in to UMLS" form with "User Name" and "Password" fields and a yellow "Sign In" button. There are also links for "Need a UMLS license?" and "Trouble signing in?".

At the bottom of the page, there is a footer with the "CMS.gov" logo, the text "A federal government website managed by the Centers for Medicare & Medicaid Services 7500 Security Boulevard, Baltimore, MD 21244", and a "Helpful Links" section with links to "Accessibility Policy", "Privacy Policy", "Terms Of Use", "Freedom of Information Act", "User Guide", and "Contact Us".

- 11) To initiate a connection with the Value Set Authority Center, the signed in user enters his or her UMLS credentials. This is optional.

Note: The UMLS **User Name** is not the same as the MAT User ID. The UMLS **password** may or may not be different than the password designated to access the MAT.

- 12) To begin building an eMeasure or to access an existing eMeasure, select the Measure Library tab.

III. SIGNING INTO THE MAT – EXISTING USER

Existing MAT users must complete the following steps to sign into the MAT.

- 1) Open a supported browser (Internet Explorer and Mozilla Firefox are supported browsers; Safari and Chrome are not supported).
- 2) Go to <https://www.emeasuretool.cms.gov>.
- 3) On the MAT home page select ‘Log in to the MAT’ under ‘Secure Login’ ribbon on the upper, right corner.

Figure 10 MAT Homepage



- 4) Enter MAT User ID and Password.

Figure 11 MAT Login - User ID and Password



- 5) Enter the Symantec™ Security Code as it is displayed on a registered Symantec™ VIP Access application.

The six-digit Security Code is new every 30 seconds. A timer is displayed in the upper right-hand corner of the Security Code field indicating when a new number will be generated. There is a copy function to the immediate right of the Security Code to ensure the six-digit code is copied accurately and quickly into the MAT Security Code field.

Figure 12 MAT Login - Security Code

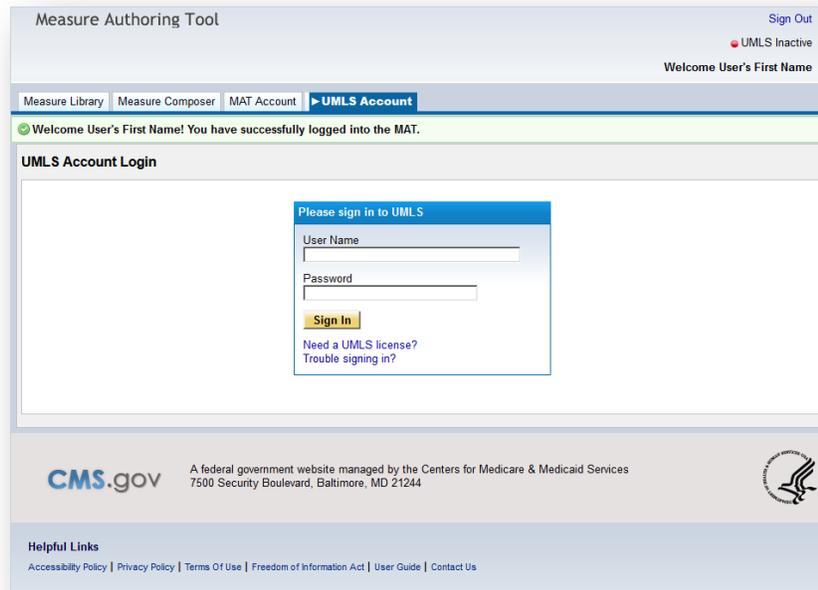
The screenshot shows the 'Welcome to the Measure Authoring Tool' login page. It has a 'Please sign in' header. Below it are three input fields: 'User ID' (containing 'MaUser1234'), 'Password' (containing '*****'), and 'Security Code' (which is empty and highlighted with a blue circle). A yellow 'Sign In' button is below the fields. A link 'Forgot your User ID or Password?' is at the bottom. A blue callout bubble with the text 'Enter Symantec™ VIP Access Security Code' points to the Security Code field.

Figure 13 Symantec™ VIP Access Application



- 6) After the MAT User ID, password, and security code are entered, click on the yellow Sign In button to access the MAT.
- 7) Users are redirected to the UMLS Account page of the MAT tool and a success message in a green banner displays below the page headings of the tool. In addition, the signed in user's first name is displayed below the UMLS status in the upper, right corner of the page.

Figure 14 Successful Login to the MAT



- 8) To initiate a connection with the Value Set Authority Center, the signed in user enters his or her UMLS credentials. This is optional.

Note: The UMLS **User Name** is not the same as the MAT User ID. The UMLS **password** may or may not be different than the password designated to access the MAT.

- 9) To begin building an eMeasure or to access an existing eMeasure, select the Measure Library tab.

IV. FORGOTTEN PASSWORD

The Forgot Your Password function provides sign-in assistance when the password is unknown. Complete the following steps to request a password reset:

- 1) Select the word 'Password' in the 'Forgot your User ID or Password?' question located below the Sign In button (yellow) on the sign-in page.

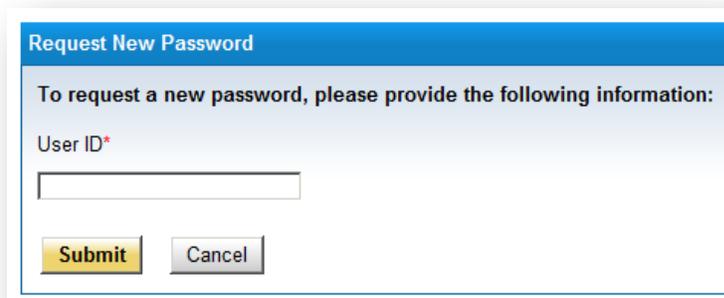
Figure 15 MAT Login



The screenshot shows the 'Welcome to the Measure Authoring Tool' login page. It features a 'Please sign in' section with three input fields: 'User ID', 'Password', and 'Security Code'. Below these fields is a yellow 'Sign In' button and a blue link that reads 'Forgot your User ID or Password?'. A blue arrow points to this link.

- 2) Enter your MAT User ID and select the Sign In button (yellow).

Figure 16 Request New Password Screen



The screenshot shows the 'Request New Password' screen. It has a blue header with the text 'Request New Password'. Below the header, it says 'To request a new password, please provide the following information:'. There is a single input field labeled 'User ID*'. At the bottom, there are two buttons: a yellow 'Submit' button and a grey 'Cancel' button.

- 3) Type in the answer to the Security Question and select the Submit button (yellow).

Figure 17 Request New Password - Security Question

Request New Password

To request a new password, please provide the following information:

User ID*

Userid1234

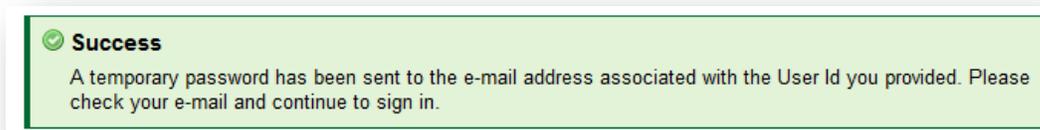
Security Question:
What was the name of your elementary / primary school?

Security Question Answer

Submit Cancel

- 4) Next, the following notification displays:

Figure 18 Success Message - Temporary Password Sent



- 5) Once the temporary password is retrieved, use it to sign into the MAT.
- 6) Enter a new password and confirm the new password. Security questions and answers may be updated at this time.
- 7) Select the Submit button (yellow). The user will be logged into the MAT and navigated to the UMLS Account tab where their UMLS credentials may be entered to initiate an active connection to the VSAC.

Note: The UMLS Account sign in page looks similar to the MAT sign in page. You are signed into the MAT when you see four tabs across the top: Measure Library, Measure Composer, MAT Account, and UMLS Account. Enter your UMLS credentials on this page to initiate a connection to the VSAC.

V. RETRIEVE FORGOTTEN USER ID

The Forgot Your User ID function provides sign-in assistance. To retrieve a MAT User ID, complete the following steps.

- 1) Select the words 'User ID' in the 'Forgot your User ID or Password?' question located below the Sign In button (yellow) on the sign-in page.

Figure 19 MAT Login - User ID

- 2) Users are prompted to insert the email address associated with the MAT account. Type the email address associated with the MAT account in text box provided and select the Submit button (yellow).

Figure 20 Request User ID

- 3) The following notification displays above the sign in window, and an email with the User ID is sent to the associated email address.

Figure 21 Success Message - MAT User ID Sent

- 4) Users must access the email account to retrieve the forgotten User ID.

- Once the User ID is retrieved, the user can use it to log into the MAT. If the user has also forgotten the password refer to forgotten password instructions.

VI. MANAGE PERSONAL INFORMATION

In the MAT Account tab of the MAT tool, the Personal Information sub-tab contains information entered when the original account was created. Here, users can update their name, title, email address, and phone number. The organization and organization OID may be changed by contacting the [MAT Help Desk](#). After updating personal information users must enter their existing password to confirm and save changes.

Figure 22 MAT Account Page

The screenshot displays the 'Update Personal Information' form within the MAT Account section. The form includes the following fields: First Name*, M.I., Last Name*, Title, Organization*, Organization OID*, Email Address*, and Phone Number* (with a placeholder for (555-555-1234)). A note indicates that an asterisk (*) denotes a required field. Below the form, there is a 'Save' button and an 'Undo' button. The footer of the page features the CMS.gov logo, the text 'A federal government website managed by the Centers for Medicare & Medicaid Services, 7500 Security Boulevard, Baltimore, MD 21244', and a 'Helpful Links' section with links to Accessibility Policy, Privacy Policy, Terms Of Use, Freedom of Information Act, User Guide, and Contact Us.

VII. MISCELLANEOUS

A. Application Timeout

Users will be automatically logged out of the MAT after 30 minutes of inactivity. Users will receive the following warning message after 25 minutes of inactivity, which will prompt them to continue their MAT session.

Figure 23 Warning Message - MAT Session Expiring

Warning! Your session is about to expire at Jan 24, 2013 1:53:00 PM. Please click on the screen or press any key to continue. Unsaved changes will not be retained if the session is allowed to time out.

User computers that are inactive for more than 30 minutes, including those re-awakening from sleep mode, will time-out and the MAT will refresh to display the login page. Any unsaved changes will be lost if the user's session times-out. When awakening computers from sleep mode, users should allow time for the MAT to present the login page and not assume the page displayed will be active.

B. Technical / User Support

1. Website

In addition to the User Guide, other training and supporting documents are available to respond to inquiries and answer questions pertaining to the MAT. The Training & Resources tab located on the MAT public website, <https://www.emasuretool.cms.gov>, provides additional training and support documentation.

2. Webinar/Web-based trainings

Training Webinars are scheduled prior to any major release. The training Webinar includes a discussion of the included enhancements and impact(s) on existing data within the MAT, as well as a live demonstration of the tool's new features, if applicable.

Web-based trainings are developed periodically to educate users on changes in the Measure Authoring Tool. Users are notified by email as the web-based trainings become available.

Links are available on the Training & Resources tab of the public website with quick guides and information for popular MAT-related topics. Several recorded short informational tutorials are available.

3. Help Desk

The technical MAT Support help desk is available with live technical support by completing the form on the [Contact Us page](#) of the MAT public website or by calling 1-800-673-0655 from 7:30 AM to 5:00 PM Central Time, Monday through Friday.

Technical support is closed on the following holidays:

New Year's Day	Thanksgiving Day
Memorial Day	Day after Thanksgiving
Independence Day	Christmas Day
Labor Day	

C. System Maintenance

The MAT is available by accessing, <http://www.emasuretool.cms.gov>. MAT users are notified via email about scheduled and unscheduled system maintenance days.

1. Scheduled Maintenance

Scheduled maintenance for the MAT occurs on the second weekend of each month from 1:00 AM Eastern Time (ET) on Saturday through 7:00 PM ET on Sunday limited MAT access.

2. Additional Maintenance

A secondary maintenance window is reserved at 8:00 pm ET on a Tuesday of each month.

The User Guide is updated with each new release of the MAT, based on user feedback.

Comments on the MAT may be submitted by completing the [Contact Us form](#) on the public website.

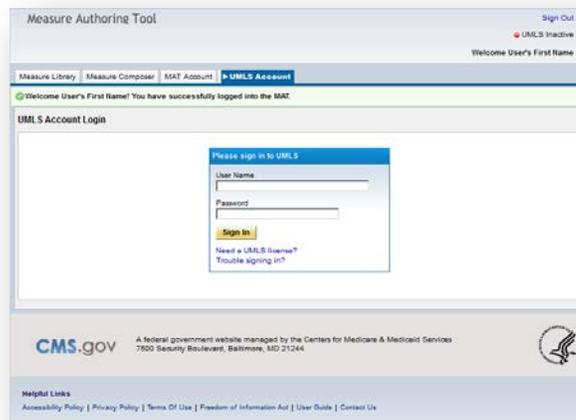
Chapter 4: Tool Navigation

Chapter Overview: This chapter explains how users can navigate the Measure Authoring Tool (MAT) and many of its features. Detail on the main pages of the MAT, including Measure Library, Measure Composer, MAT Account, and UMLS Account pages is provided.

I. HOW TO NAVIGATE THE MEASURE AUTHORING TOOL

When users sign in to the MAT, the following page displays.

Figure 24 MAT Landing Page



To navigate through the MAT, users can select one of four tabs:

- Measure Library,
- Measure Composer,
- MAT Account, and
- UMLS Account.

As displayed in the image above, the selected tab displays with bold text and a caret to the left of the title of the tab with blue background and white letters in contrast to non-selected tabs.

The Measure Library displays a list of measures that a user has access to in the MAT.

The Measure Composer has five tabs a user can navigate:

- Measure Details,
- QDM Elements,
- Clause Workspace,
- Population Workspace,
- Measure Packager, and
- Measure Notes.

The Clause Workspace has three additional sub-tabs:

- Populations,
- Measure Observations, and
- Stratification.

Note: Only the sub-tabs relevant to the measure scoring type display.

The MAT Account has three additional sub-tabs:

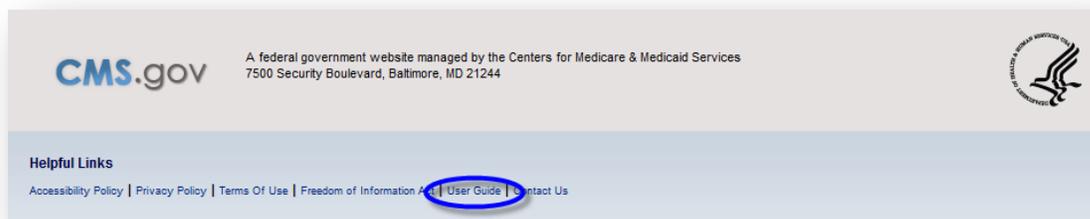
- Personal Information,
- Security Questions, and
- Password.

The UMLS Account page provides users with the ability to integrate, or log into, the VSAC while working within the MAT.

Navigation Tip: To integrate with the VSAC, users must enter their UMLS license username and password in the UMLS Account tab. Detailed instructions for integrating with the VSAC through the MAT are provided in [Chapter 5: Integrating with the Value Set Authority Center](#).

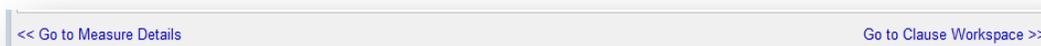
A user may select the 'User Guide' Link in the footer of the MAT website to access the MAT User Guide.

Figure 25 MAT Website Footer



Users also can use the back and forward browser buttons to navigate to where they were previously in the MAT. In addition, users can refer to the links at the bottom of each page within the Measure Composer to help guide the measure creation process.

Figure 26 Measure Composure Navigation Bar



To save work in the Measure Details, Measure Composer, and Measure Populations, users must select the Save button (yellow) located on the bottom, left-side of the page.

Users also can save changes to a measure in the MAT by using the keyboard shortcut of Ctrl+Alt+s. Upon successfully saving work, a confirmation message displays.

While navigating from Measure Details, Clause Workspace, Population Workspace, or Measure Packager in the MAT after making a change, the user is prompted to save changes before exiting. Changes are not saved automatically. The following message displays prompting the user to save changes.

Figure 27 Warning Message - Unsaved Changes



Additionally, while navigating between tabs in the MAT, the user may see a "Loading Please Wait" message while the data for each tab loads. Please wait for the page to finish loading before attempting to complete work on the page. The loading is complete when both messages disappear.

II. HOW TO CREATE AN EMEASURE

The MAT workflow is designed so that users can create a measure in a sequential flow. The first tab, Measure Library, allows users to create a new measure or edit an existing measure.

Within Measure Composer, users can

- Enter measure details,
- Build, apply, copy, modify, or remove QDM Elements,
- Manually update value set data from the VSAC,
- Create the measure logic using the Quality Data Model (QDM),
- Build specific measure populations,
- Specify components of the measure to be included in the export, and
- Add measure notes.

The UMLS Account page allows users to integrate with the VSAC so that the VSAC value set data can be retrieved and used for building measure logic.

As mentioned in the [How to Use This User Guide section in Chapter 2](#), the User Guide helps users walk through creating a measure in the MAT. The steps a user must take to build a measure are covered by providing examples of using the sample eMeasure titled MAT v4.3.0 User Guide Proportion Measure.

Chapter 5: Integrating with the VSAC

Chapter Overview: This chapter discusses the integration with the Value Set Authority Center (VSAC) and the MAT. In addition, instructions for integrating with the VSAC to retrieve value set data are provided.

I. VALUE SET AUTHORITY CENTER BACKGROUND

The Value Set Authority Center is provided by the NLM in collaboration with the ONC for Health Information Technology and CMS.

The VSAC's website, <https://vsac.nlm.nih.gov/>, was first published October 25th 2012. As stated on the VSAC website, the VSAC provides search, retrieval and download capabilities for value sets and assures on-going validity and accuracy of value sets. In October of 2013, value set authoring was made available publicly in the VSAC, thus providing tools for users to create value sets.

The VSAC provides downloadable access to value sets contained in the 2014 Meaningful Use Clinical Quality Measures, and is actively incorporating new value sets for other use cases, new measures, and updating existing measures.

II. UMLS LICENSE

A Unified Metathesaurus License (UMLS) is required to access value sets contained within the VSAC. To request a UMLS license, submit a request at, <https://uts.nlm.nih.gov/license.html>.

The UMLS user name and password is used to establish an active connection to the VSAC allowing MAT users to retrieve the VSAC value set data.

III. INTEGRATING WITH THE VALUE SET AUTHORITY CENTER

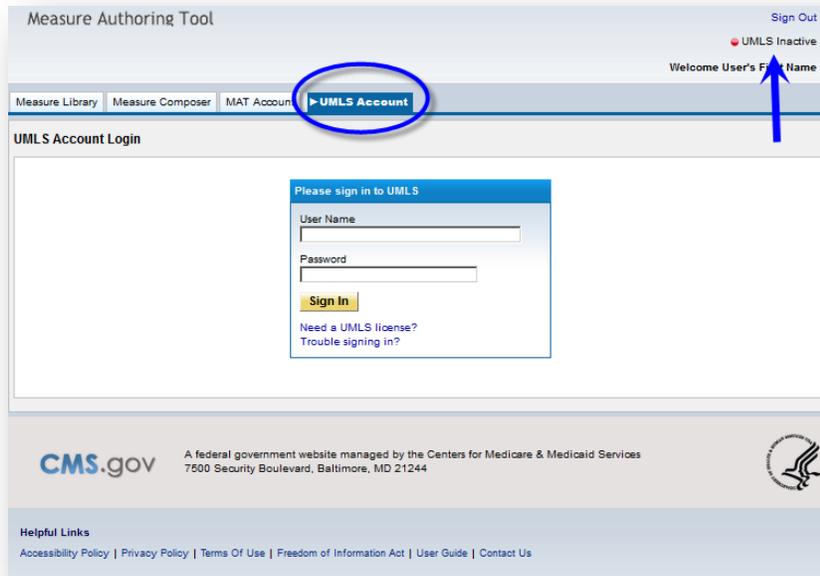
To retrieve value set data from the VSAC through the MAT, users must establish an active connection to the VSAC using their UMLS license credentials. MAT users are not required to establish an active connection to the VSAC to work within the MAT; however, the VSAC value set data cannot be retrieved and applied to a measure without an active VSAC session.

A. Establishing an Active Connection to the VSAC

1. After logging into the MAT, users are automatically navigated to the UMLS Account page. In the upper, right corner of the page, below the 'Sign Out' option, there is a dot (red) with the

text 'UMLS Inactive' displayed. This indicates the MAT user does not have an active connection to the VSAC. The first step is to enter your UMLS user name.

Figure 28 UMLS Account Page



2. Next, enter your UMLS password.
3. Select the Sign In button (yellow) positioned below the fields for user name and password.
4. MAT users receive a success message after a successful connection is established to the VSAC. After a successful connection, the dot in the upper right-hand corner of the screen changes to green and the text "UMLS Active" displays. (If an incorrect UMLS user name or password is used, the message displayed is "Login failed. Please sign in again".)

B. Maintaining an Active Connection to the VSAC

After the UMLS license credentials are successfully authenticated, MAT users are connected to VSAC for up to eight hours. After a continuous 8-hour session, MAT users are required to reenter their UMLS user name and password to reconnect to the VSAC. As long as the MAT session is maintained consistently during that 8-hour time frame, the ability to retrieve the VSAC value set data is retained.

If there is no activity for 30 minutes within the MAT tool, the MAT and the VSAC sessions are discontinued simultaneously. A warning message displays after 25 minutes of inactivity in the MAT tool.

In addition to the idle MAT session timing out, logging out of the MAT, planned downtime, and unanticipated downtime will cause the VSAC connection to become inactive.

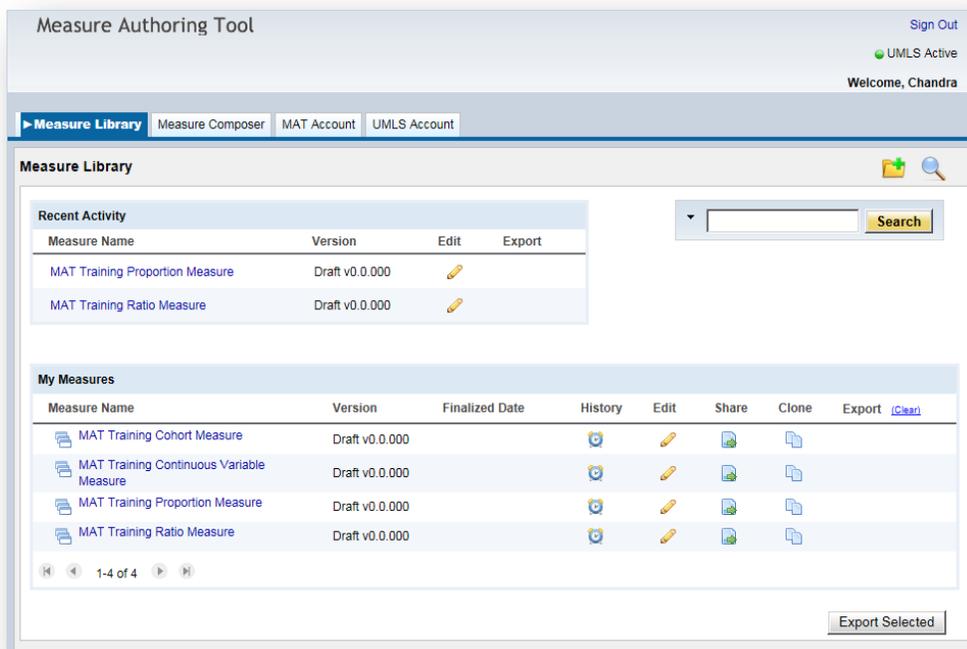
Navigation Tip: After establishing a successful connection to the VSAC, MAT users may proceed to the Measure Library to select an existing measure to view or edit, or create a new measure. [Chapter 6: Measure Library](#) provides detailed information about the measure found within the Measure Library.

Chapter 6: Measure Library

Chapter Overview: This chapter highlights the features of the Measure Library. Users will learn how to create a new measure, create a major or minor version of an existing measure, create a draft of an existing measure, and create a clone of an existing measure. This chapter also includes instructions for exporting MAT version 3, and MAT version 4 or higher measure packages.

The Measure Library displays an alphabetical list of all versions and drafts of measures entered into the MAT. The two most recently viewed measures are displayed in the 'Recent Activity' box at the top of the page. The default setting displays the first 25 measures owned or shared with the signed in user.

Figure 29 Measure Library



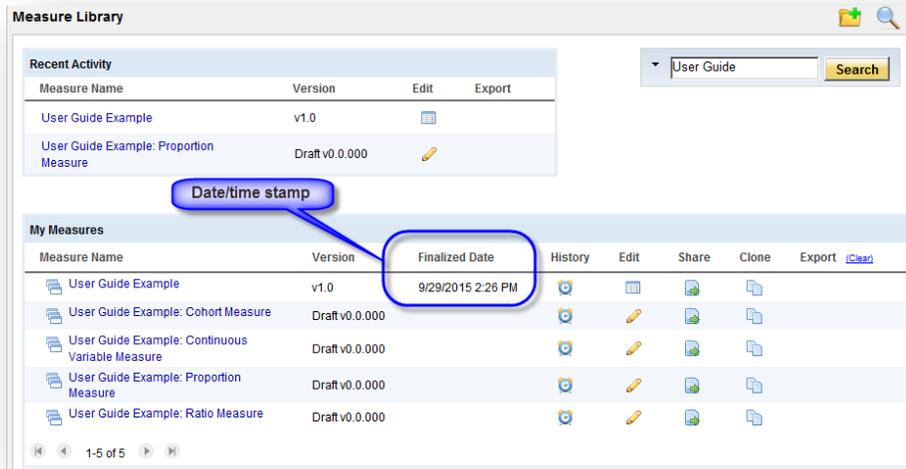
The MAT retains all saved versions and one draft version of a measure. All measure names and associated versions of each of these measures display alphabetically, with the most recent draft or version at the top of the display. All versions and the most recent draft of each measure are considered a measure family. The most recent version of a measure family is identified by the following visual icon.

Figure 30 Measure Family Icon



A date/time stamp of when a version was saved appears to the right side of the measure name and version number, in the finalized date column. A variance in shading is used to differentiate the measure families.

Figure 31 Date/Time Stamp

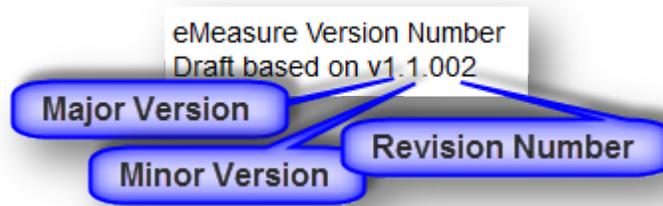


When a measure is in draft mode, the user is given the opportunity to save without versioning, update to a major version, or update to a minor version. When the user selects save without versioning, the edits and changes the user has made are saved in its existing draft mode. When a user selects to update to a major version, the MAT increments the version number to the next major whole number that is available (e.g. 1.5 would increment to 2.0). When a user selects to update to a minor version, the MAT increments the version number to the next decimal increment that is available (e.g. 2.4 increments to 2.5). Version numbers are not re-used within an individual measure.

The eMeasure Version Number appears in the version column of the Measure Library eMeasure list, on the Measure Details page, within the eMeasure list when adding a component measure of the MAT, and within the SimpleXML, HTML human readable, and the HQMF R2.1 XML files. The first set of digits is the Major Version, the second set is the Minor Version, and the third set (if applicable) is the number of times the measure has been packaged. The number of times a measure has been packaged is called the revision number.

In the example displayed below, the version number is 1.1 and the revision number is 2. Thus, measure version 1.1 has been packaged 2 times.

Figure 32 eMeasure Version Number



The measure name, version number without the revision number, and finalized date (for versioned measures) will display on all of the Measure Composer sections, Measure Details, QDM Element, Clause Workspace, Population Workspace, Measure Packager, and Measure Notes, to allow users the ability to verify that the correct measure and version is being created or edited.

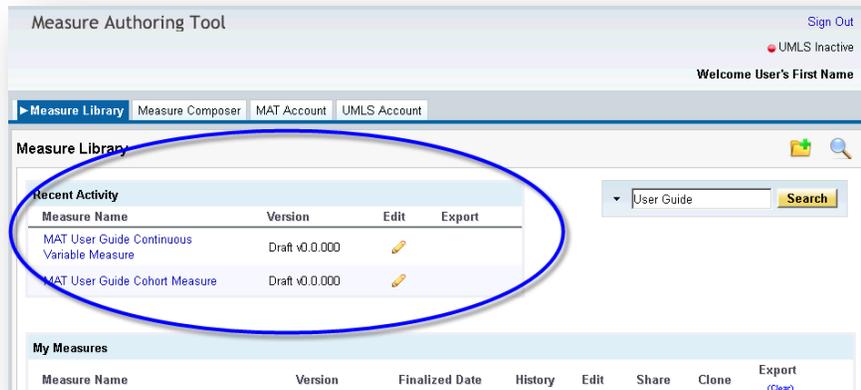
Note: Only measures packaged following the MAT version 4 release are assigned revision numbers. For all measures versioned prior to the MAT version 4 release, the revision number is always '000'. In addition, measure packages are only counted if they were created following the MAT version 4 release. For example, if a measure draft was packaged 3 times prior to the MAT version 4 release, and packaged 1 time following the MAT version 4 release, the revision number is '001'. Versioned measures, not in draft status, are assigned only the Major and Minor version number (i.e. Version 3.1; Version 1.1).

Users can create a new measure or a draft of an existing measure, edit, share, clone, or export measures in the Measure Library tab. Users also can view and update the measure history log. The following section details how to complete each task.

I. RECENT ACTIVITY

The Measure Library displays the two most recent measures accessed by the MAT user logged into the tool. The 'Recent Activity' text box, displayed in the upper, left corner of the page, lists the measure name, version, edit icon and export icon(s).

Figure 33 Measure Library - Recent Activity



A. Access a Measure Listed in 'Recent Activity'

MAT users are able to quickly access the two most recently viewed measures. To access a measure in the 'Recent Activity' list box complete the following steps:

1. Identify the name of the measure in the 'Recent Activity' box to be accessed.
2. Select the name of the measure displayed in the left column of the display (blue lettering).

Figure 34 Measure Library - Recent Activity



3. After selecting the name of the desired measure, the Measure Details page for the selected measure displays.

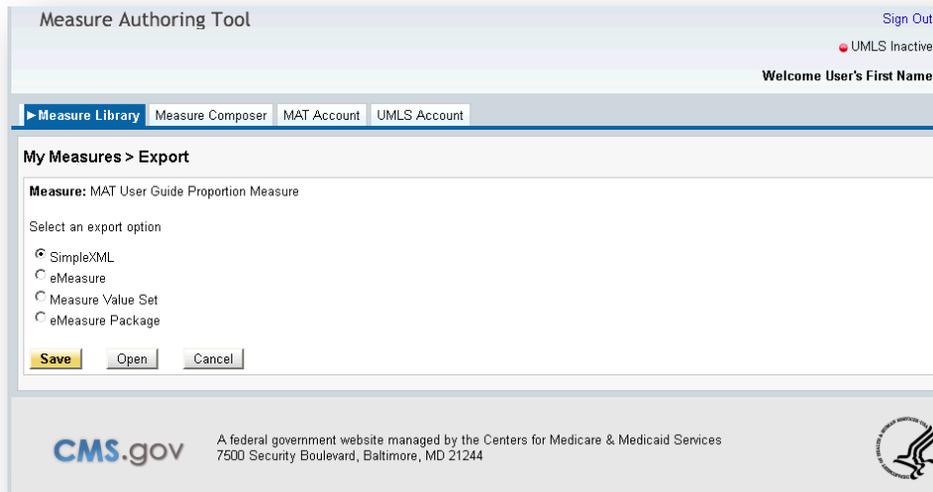
B. Export a Measure Listed in 'Recent Activity'

1. Identify the measure name to be exported.
2. Verify the export icon is displayed in the third column of the 'Recent Activity' display in the same row as the measure name to be exported. This signifies this measure has been successfully packaged and may be exported.

Note: MAT version 3 (MATv3) measure packages are generated for any measure last packaged before July 25th, 2014. MAT version 4 (MATv4) measure packages are generated for any measure last packaged between July 25th, 2015 and before the October 6th, 2015 release. MAT version 4.3 (MATv4.3) and above measure packages are generated for any measure packaged after the October 6th, 2015 release.

3. Select the export icon (represented by a box with a green arrow).
4. Select the radio button positioned to the left of the export format desired: SimpleXML, eMeasure, Measure Value Set, and eMeasure Package.

Figure 35 Measure Export Options



Navigation Tip: For additional information about exporting a measure and the available export formats, visit the [Export section of this chapter](#).

II. CREATE A NEW MEASURE

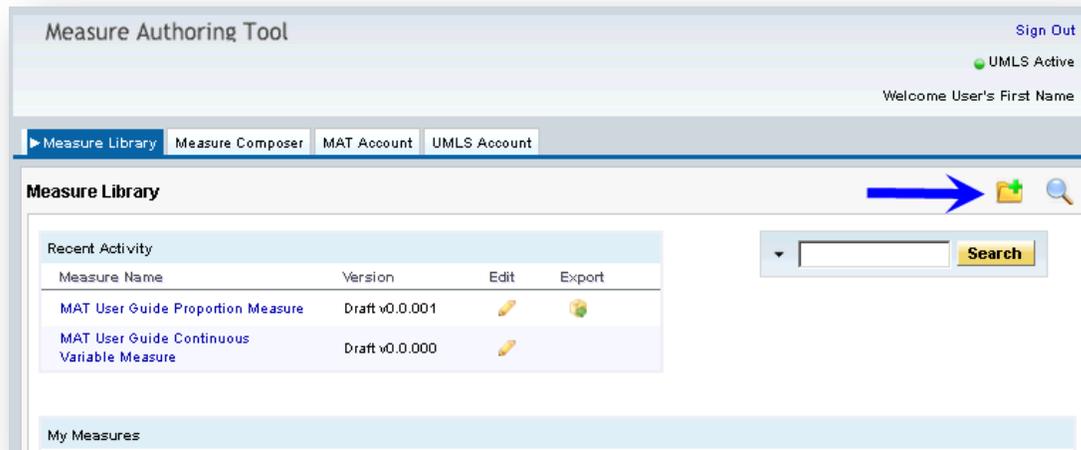
The MAT is an instrument to guide consistency with respect to measure specifications; therefore users must first address measure intent and required content. To create a measure, users should first consider what is being measured, related evidence, feasibility of accessing required information, and the intended impact of the measure. Up front attention to information required to specify the measure streamlines use of the MAT. Once users define the measure concepts, they are ready to create an eMeasure.

The following instructions guide the user through the MAT workflow. The MAT allows users to create proportion, ratio, continuous variable, and cohort measures (each is a unique method of measure scoring). [Appendix C](#) lists all required and optional system clauses (initial population, numerator, numerator exclusions, denominator, denominator exclusions, denominator exceptions, measure population, measure population exclusions, measure observation, supplemental data elements and risk adjusted measures) by the method of measure scoring. With this basic information, users can add information in the MAT to create the measure.

A. To create a measure in the MAT:

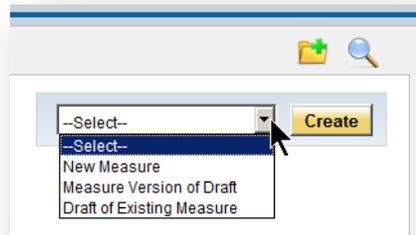
1. Select the folder icon with a plus sign (green) in the top, right corner of the Measure Library.

Figure 36 Measure Library



- The 'Create' tool populates below the 'Create Measure' icon. Select the arrow to the right of the text box to view the dropdown options.

Figure 37 Create Measure Dropdown Options



- Select the words 'New Measure' in the dropdown box.
- Select the Create button (yellow) to the right of the dropdown box.
- Enter the name of the new measure as well as an abbreviated name. The name and abbreviated name should not include special characters, such as ? . , ; : [] () / < > - _ ' " * & % # @ ! The name and abbreviated name can be edited in the future. For instructions visit the Edit the Measure Name or Measure Scoring Type section in this document. Choose a short, but sufficiently descriptive abbreviated name as it is used in the MAT to name the file when the measure is exported.
- Users must also select the type of measure scoring. This field displays the type of measure scoring for a given measure:
 - Cohort
 - Continuous Variable
 - Proportion

- Ratio

The Measure Scoring (type) can be edited in the future. However changing measure scoring type will result in the removal of populations in the Clause Workspace that do not apply to the measure scoring and existing groupings in the Measure Packager will be deleted. As noted in [Appendix C](#), each measure scoring type has a specific set of required and allowable components. Choosing the appropriate measure scoring type at the beginning will potentially avoid re-work later in the process.

Navigation Tip: For definitions on the various types of measure scoring (proportion, ratio, and continuous variable, and cohort), please visit the [glossary](#).

Figure 38 Create New Measure Page

The screenshot shows the 'Create New Measure' page in the Measure Authoring Tool. The page title is 'Measure Authoring Tool' and it includes a 'Sign Out' link and 'UMLS Active' status. The user is logged in as 'User's First Name'. The page has tabs for 'Measure Library', 'Measure Composer', 'MAT Account', and 'UMLS Account'. The main content area is titled 'My Measures > Create New Measure' and contains the following form:

- Instruction: Enter a measure name and abbreviated name. Then continue to the Measure Composer.
- Requirement: All fields are required.
- Name: Text input field containing 'MAT User Guide Cohort Measure'.
- Abbreviated Name: Text input field containing 'UG Cohort'.
- Measure Scoring: A dropdown menu with 'Cohort' selected. Other options are 'Continuous Variable', 'Proportion', and 'Ratio'.
- Buttons: A 'Cancel' button is located to the right of the dropdown menu.

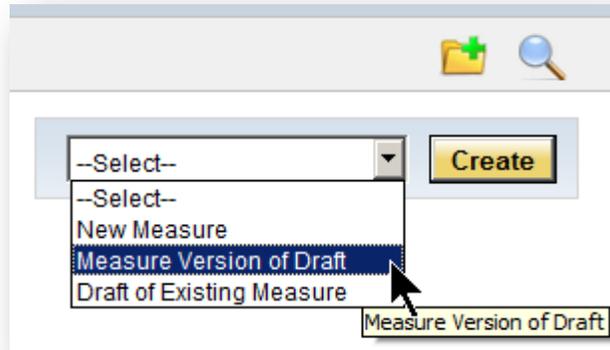
7. Select the Save and Continue button (yellow). The MAT defaults all saved new measures in draft mode, titled Version 0.0, giving the users the ability to complete the measure in draft mode prior to versioning it.
8. Once Save and Continue is selected, the MAT navigates the user to the Measure Details tab in the Measure Composer.

III. SAVE A DRAFT AS A MAJOR OR MINOR VERSION

To create a major or minor version of a draft measure, users need to determine if the draft measure should be saved as a major or minor version. The 'Create Measure Version of Draft' page of the Measure Library displays the list of measures and their current version status. MAT users are able to page through the list of measures by using the pagination tool located at the bottom of the measures list. No more than 25 measures display in the list at a time.

- 1) Select the Create Measure icon, a folder with a plus sign (green), in the upper, right corner of the page.
- 2) Select Measure Version of Draft from the dropdown box and select the Create button (yellow) to the right of the dropdown box.

Figure 39 Create Measure Version of Draft



- 3) Select the measure draft needed to create the desired measure version by selecting the radio button positioned to the left of the measure name.

Note: MAT users may perform a targeted or refined search of the available measures for versioning by selecting the 'Search' icon located in the upper, right corner of the 'Create Measure Version of a Draft' page.

- 4) Next, choose the version type by selecting the radio button positioned to the left of Major or Minor.

Figure 40 Create Measure Version of Draft Page



Note: Version numbers continue to increment to the next version number up to 999. After 999, the version number resets to 0.

- 5) Select the Save and Continue button. The MAT automatically logs the name of the measure, the date and time the measure was saved, and the user name of the user saving this measure in the measure history log.
- 6) Once Save and Continue is selected, the MAT navigates to the Measure Library tab. The new measure version displays in the Measure Library next to the measure name.

IV. CREATE A DRAFT OF AN EXISTING MEASURE

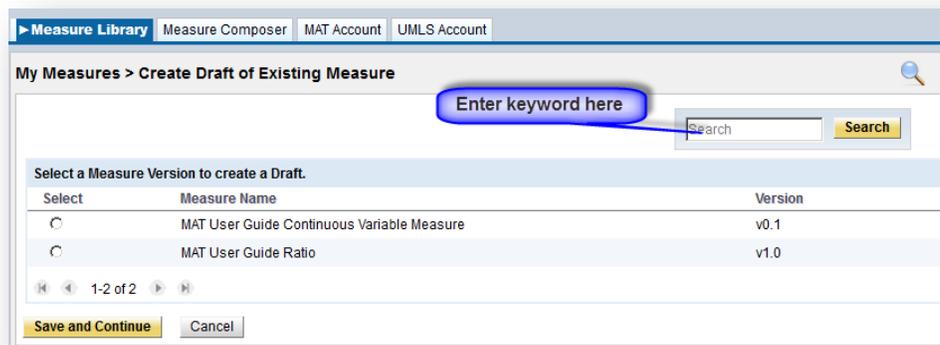
To edit an existing measure that does not already have a draft that is editable, users should create a draft of the existing measure. If a draft of the measure already exists, the user can edit the draft but cannot create a new draft. Users should confirm that no draft of the measure exists and then determine what measure version to use to create the desired draft of the measure.

The 'Create a Draft of Existing Measure' page of the Measure Library displays the list of versioned measures owned or shared with the signed in user.

MAT users are able to page through the list of the versioned measures by using the pagination tool located at the bottom of the measures list. No more than 25 measures display in the list at a time.

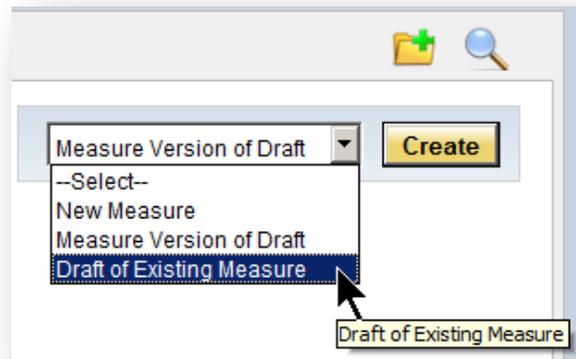
A search field is available in the upper, right corner of the 'Create a Draft of Existing Measure' page to allow MAT users to perform a keyword search for the desired measure. After selecting the search icon, MAT users are able to perform a keyword search for their desired measure.

Figure 41 Create Draft of Existing Measure – Keyword Search



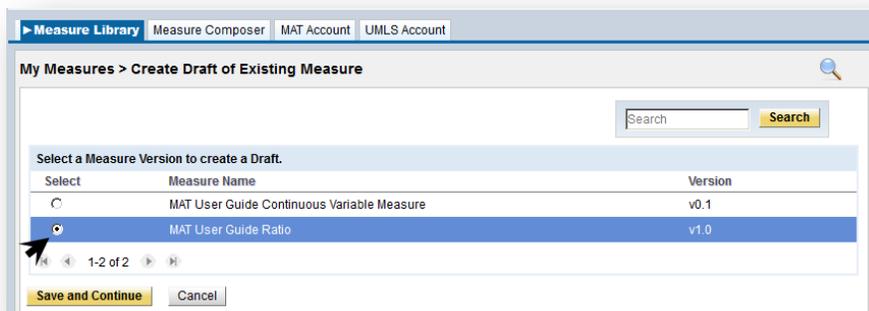
- 1) Select the 'Create Measure' icon, a folder with a plus sign (green) in the upper-right corner of the page.
- 2) Select 'Draft of Existing Measure' in the 'Create Measure' dropdown and select the Create button (yellow).

Figure 42 Draft of Existing Measure



- 3) Select the radio button to the left of the name of the appropriate measure version to create the desired draft.

Figure 43 Create Draft of Existing Measure - Measure Selected



- 4) Select the Save and Continue button located on the bottom, left side of the page.
- 5) Once Save and Continue is selected, the MAT automatically navigates to the Measure Details page for the new measure draft.

V. ACCESS EXISTING MEASURES

The Measure Library displays a list of measures the user has created by default. Pagination is available at the bottom of the measures list to allow users to search existing measures page by page. Twenty five measures are displayed per page.

A. User Is Measure Owner

If the user accessing the measure is the measure owner, measure icons appear in the History, Edit, Share, and Clone columns to enable these functions. If the user accessing the measure is not the measure owner, the Share and Clone icons are gray and disabled. The Edit icon is present but inactive, and the History icon remains enabled and visible.

Figure 44 Measure Library - Share and Clone Icons

Measure Name	Version	Final	Share	Clone	Export	Clear
MAT Training Cohort Measure	Draft v0.0.000					
MAT Training Continuous Variable Measure	Draft v0.0.000					
MAT Training Proportion Measure	Draft v0.0.000					
MAT Training Ratio Measure	Draft v0.0.001					
MAT Training Ratio Measure	Draft v0.0.000					

B. User Is Not Measure Owner

If the measure owner has provided modify access to the signed-in user, the Edit pencil icon is displayed.

If a measure is being edited by another user, the pencil icon under the Edit column changes to a padlock icon, pictured below, to signify to users the measure is currently locked for editing by another user. Hovering over the icon displays the email address of the user currently accessing the measure. The measure history log captures the edits the user makes to the measure along with the user name.

Figure 45 Measure Locked Icon



When a measure is being edited by another user, the Clause Workspace and Population Workspace is in view-only mode for all other users.

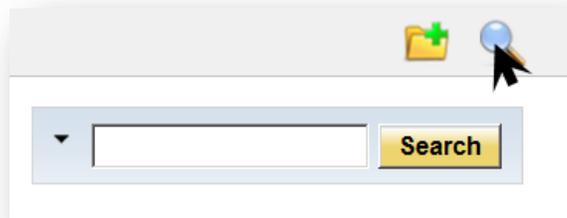
VI. SEARCH EXISTING MEASURES

Users can search existing measures by using a variety of search options. The Measure Library displays the first 25 measures owned by the user in alphabetical order by default. The user may also choose to search 'All Measures' within the MAT tool. Users can page through the existing measures or search for specific measures in the Measure Library by using the search function. This function allows users to search by keyword, measure name, abbreviated measure name, measure owner, measure steward, eMeasure Identifier.

Instructions for using the search tool within the Measure Library are provided below.

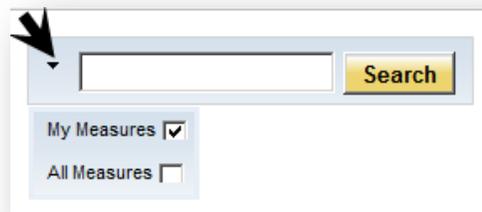
- 1) Select the 'Search' icon (magnifying glass) in the upper, right corner of the Measure Library, positioned to the right of the 'Create' icon, a folder with a plus sign (green). A search text box appears with a dropdown option on the left of the text box and a Search button (yellow) positioned to the right of the text box.

Figure 46 Search Measure Library



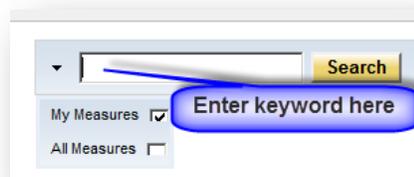
- 2) Select the dropdown box by selecting the arrow on the left-side of the search box.
- 3) Select the My Measures checkbox to search only the measures created and owned by the signed in user; or select the 'All Measures' checkbox to search all measures within the Measure Authoring Tool.

Figure 47 Search My Measures



- 4) Enter a keyword in the text box to further refine the search.

Figure 48 Search My Measures - Insert Keyword



The search for a partial name of the measure results in a display of all measures containing the keywords entered. If there are no measures that match the search, no measures are displayed and you receive an error message stating “No measures returned. Please search again.”

VII. HISTORY

The MAT maintains a log of certain events for a measure and provides users the ability to access the measure history log. Historical events recorded on the Measure History page include:

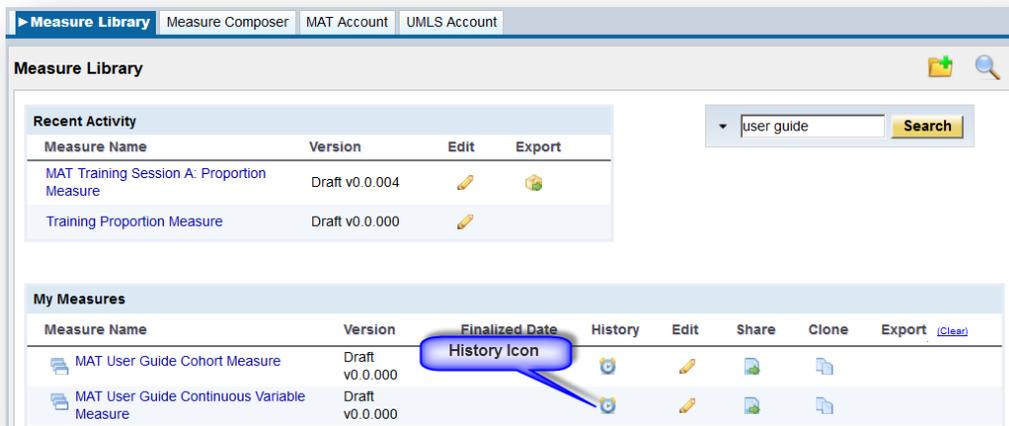
- Measure Created
- Measure Versioned
- Draft Created
- Measure Shared
- Measure Packaged
- Measure Package Exported
- Measure Exported
- Measure Ownership Changed
- DataConversion1

Each event logged includes the user action, last modified by, last modified date, and additional information. A transfer of ownership event logs the user action (Measure Ownership Changed), user name of the previous owner and the new owner, and the date and time in the measure history log. Further information is available in the [Transfer of Ownership](#) section in this document.

A. Accessing the Measure History

1. Select the Measure Library.
2. Locate the measure draft or version to be reviewed.
3. Select the alarm clock icon in the same row as the measure name (4th column).

Figure 49 Measure Library - History Icon



4. Review the measure history listed in the 'Log Entry' table.

B. History Page

Figure 50 Measure Library - History

My Measures > History

Measure: Statin Prescribed at Discharge

Log Entry			
User Action	Last Modified By	Last Modified Date	Additional Info
Measure Package Created	[REDACTED]	08/06/2014 5:12:11 PM CST	
Measure Ownership Changed	[REDACTED]	07/18/2013 11:45:54 AM CST	Measure Owner transferred from [REDACTED] to [REDACTED]
Data Conversion1	support@emeasuretool.org	06/28/2013 2:11:58 PM CST	Measure Package converted for Measure Authoring Tool v2.0 update
Measure Package Created	Email Not Found	06/28/2013 2:11:57 PM CST	
Measure Package Created	Email Not Found	06/27/2013 11:49:18 PM CST	
Data Conversion1	support@emeasuretool.org	06/27/2013 11:49:18 PM CST	Measure Package converted for Measure Authoring Tool v2.0 update
Data Conversion1	support@emeasuretool.org	06/27/2013 10:06:54 PM CST	Measure converted for Measure Authoring Tool v2.0 update.
Measure Versioned	[REDACTED]	03/08/2013 1:41:50 PM CST	Measure Version 2.0 created
Measure Package Created	[REDACTED]	03/08/2013 1:31:53 PM CST	
Export	[REDACTED]	03/08/2013 1:31:48 PM CST	Statin Prescribed at Discharge
Measure Package Created	[REDACTED]	03/08/2013 1:31:28 PM CST	
Measure Package Created	[REDACTED]	03/05/2013 4:40:43 PM CST	
Export	[REDACTED]	03/05/2013 4:40:39 PM CST	Statin Prescribed at Discharge
Measure Package Created	[REDACTED]	03/05/2013 4:40:18 PM CST	

Note: In previous versions of the MAT, users manually entered comments onto the Measure History page. Manually entered comments previously entered in the History page are now located on the Measure Notes page of the Measure Composer.

Navigation Tip: For instructions on how to manually enter a measure note, review [Chapter 12: Measure Composer-Measure Notes](#).

VIII. EDIT

The measure owner, or those to whom the owner has given permission, may edit the measure name, measure logic, or any component of the measure. If a measure is being edited by another user, the pencil icon under the edit column changes to a padlock icon to signify to users the measure is currently locked for editing by another user. Hovering over the icon displays the email address of the user currently accessing the measure. The measure unlocks when the user editing the measure stops editing and either returns to the Measure Library, times out, or logs out of the MAT.

For versioned measures, a version number and finalized date displays in the Measure Library as well as a view only icon under the Edit column. These indicators alert users that a measure can only be viewed and may not be edited. Users are prevented from making updates to that version of the measure; only measures in draft mode can be modified. For instructions on how to edit an older version of a measure by creating a draft of that version, visit the [Create a Draft of an Existing Measure](#) section in this document.

A. Edit the Measure Name or Measure Scoring Type

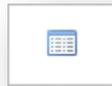
The 'Edit' icon, pictured below, can be found in the fifth column of the measure list in Measure Library.

Figure 51 Edit Icon



If a measure is neither owned by nor shared with the MAT user, a Read-only icon (pictured below) displays in the 'Edit' column of the measures list.

Figure 52 Read-only Icon



The 'Edit' icon is disabled if the measure is being accessed by another user. Please keep in mind, the measure may only be edited by the measure owner or by MAT users with whom the measure is shared. To learn more about sharing a measure, also known as providing 'Modify' access to a measure, visit the [Providing Modify-access to a MAT User](#) section in this document.

To edit the name, abbreviated name, or measure scoring type of an existing measure, follow the steps listed below:

1. Select the Measure Library tab.
2. Select the pencil icon after the measure name under the Edit column to edit the measure name, abbreviated name, or measure scoring type.

Note: Selecting the measure name will take the user to the Measure Details page.

3. The next page allows users to modify the measure name, abbreviated name, and measure scoring options. Modify the measure name, abbreviated name, and measure scoring fields and select the Save and Continue button (yellow).

Figure 53 Editing Measure Name, Abbreviated Name, and Measure Scoring

Measure Library | Measure Composer | MAT Account | UMLS Account

My Measures > Edit Measure

Enter a measure name and abbreviated name. Then continue to the Measure Composer.
All fields are required.

Name
MAT User Guide Cohort Measure

Abbreviated Name
JUG13 Cohort

Measure Scoring
Cohort

WARNING: Changing the 'Measure Scoring' will have the following impacts:
 • Populations in the Clause Workspace that do not apply to the 'Measure Scoring' selected will be deleted.
 • Existing Groupings in the Measure Packager will be deleted.

Save and Continue | Cancel

- The following warning message displays to the right of the measure scoring field to provide users with guidance relating to the impacts of changing the measure scoring type.

Figure 54 Warning Message - Changing Measure Scoring Type

WARNING: Changing the 'Measure Scoring' will have the following impacts:
 • Populations in the Clause Workspace that do not apply to the 'Measure Scoring' selected will be deleted.
 • Existing Groupings in the Measure Packager will be deleted.

- After selecting **Save and Continue**, the user will be returned to the Measure Library.

Note: When the name of the measure is changed or edited, the history log records the new name for the current and future version of that measure. The version of the measure previous to the name change retains the name of the measure at the time that version was saved.

B. Edit the Measure—Measure Logic

To edit a measure's details, QDM element list, logical clauses, or measure populations, complete the following steps:

- Select the Measure Library.
- Select the current draft of the measure in the Measure Name column.
- Users are directed to the Measure Details page for the selected measure. Make edits as desired within Measure Details and select the Save button (yellow) on the bottom, left of the page to retain edits. Proceed to [Chapter 7 Measure Composer-Measure Details](#) for additional information.
- To make edits to the QDM element list, select the QDM Elements page. Proceed to [Chapter 8 Measure Composer-QDM Elements](#) for additional information for removing and modifying applied QDM elements and attributes.

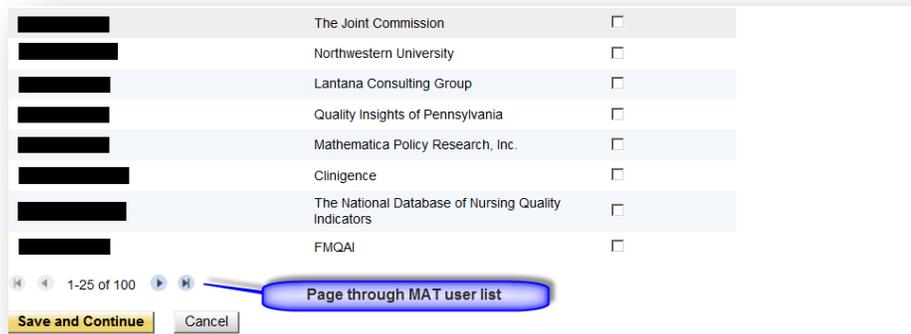
5. To make edits in the Clause Workspace, select the Clause Workspace tab and make the desired changes. Again, select the Save button (yellow) at the bottom of the page to retain changes. Proceed to [Chapter 9 Measure Composer-Clause Workspace](#) for additional information.
6. To make edits in the Population Workspace, select the Population Workspace tab and make the desired changes. Select the Save button (yellow) at the bottom of the page to retain changes. Proceed to [Chapter 10 Measure Composer-Population Workspace](#) for additional information.

IX. SHARE

A measure owner can share his or her measures with other MAT users by granting them permission through the share icon in the Measure Library. Sharing the measure allows other users to edit the measure. Throughout the user guide, this is referred to as Modify-access.

The Measure Sharing page of the Measure Library lists the first 25 active MAT users in alphabetical order. To page through the remaining names in the MAT user list, a pagination tool is available in the bottom, left corner of the MAT user list.

Figure 55 MAT User List - Pagination Tool



A. Providing Modify-access to a MAT User

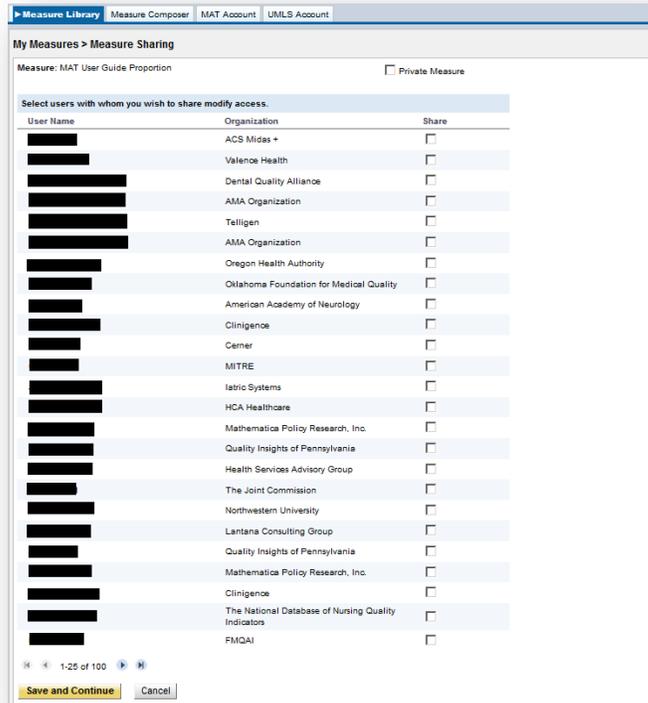
All measures created by the MAT user include an icon, pictured below, in the Share column of the Measure Library. The measure creator can provide Modify-access to a measure with other users following the steps listed below.

Figure 56 Share Icon



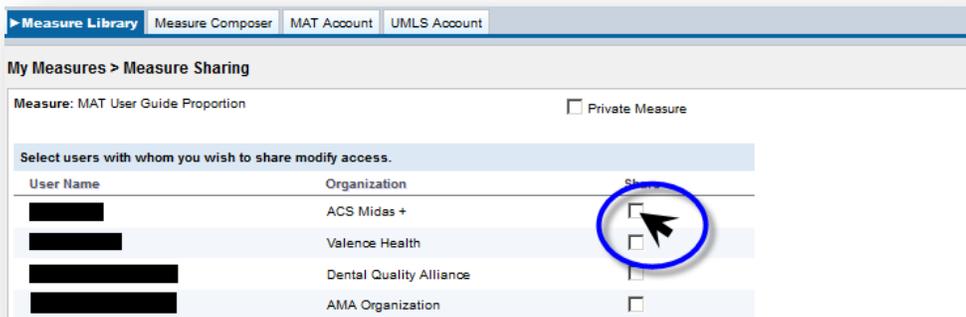
1. Select the Share icon.
2. Users are presented with a list of all other MAT users with whom sharing is possible. The list includes the MAT user’s name and organization.

Figure 57 Measure Sharing - MAT User List



3. Share the measure with a user by selecting the check box in the ‘Share’ column to the right of the user’s name and organization. This allows the user to modify the measure. The recipient user now sees the pencil in the ‘Edit’ column of the measure list in the Measure Library.

Figure 58 Measure Sharing - MAT User Checkbox



4. If a selection is made in error, select the Cancel button (gray) or deselect the check box next to the user name and organization in the 'Share' column.
5. When selection(s) are verified, select the Save and Continue button on the bottom, left corner of the page. The recipient user has a pencil icon in the Edit column after "Modify" access is provided.

For measures the user does not own, the Share icon is gray and disabled. Only the measure owner can assign permission for others to edit the measure.

The presence of an active share icon indicates the measure is owned by the user. The padlock icon represents a measure shared with other users which is currently being edited. The pencil icon represents a measure shared.

Figure 59 Measure Library - Share and Clone Icons

Measure Name	Version	Final	Share	Clone	Export	Clear
MAT Training Cohort Measure	Draft v0.0.000		Enabled Share Icon	Enabled Clone Icon		
MAT Training Continuous Variable Measure	Draft v0.0.000		Enabled Share Icon	Enabled Clone Icon		
MAT Training Proportion Measure	Draft v0.0.000		Disabled Share Icon	Disable Clone Icon		
MAT Training Ratio Measure	Draft v0.0.001		Enabled Share Icon	Enabled Clone Icon		
MAT Training Ratio Measure	Draft v0.0.000		Disabled Share Icon	Disable Clone Icon		

B. Accessing Shared Measures

Once a measure is shared with a user, the measure appears in the user's My Measures list in the Measure Library. The measure can be viewed by selecting the measure name as noted in the section regarding measure editing. Unless the measure owner shares the measure, the user is not able to edit the measure or the measure name. A measure can only be modified or edited by one user at a time. Therefore, when a measure is being edited by another user, the measure is available as Read-only for all other users who have Modify-access. All other users continue to have Read-only access to all measures regardless of edit status.

C. Transfer of Ownership

Requests to transfer ownership of one or more measures to another user may be submitted to the [Measure Authoring Tool Help Desk](#) by completing the Contact Us form located on the Contact Us page of the public website, <https://www.emasuretool.cms.gov>. The current owner of the measure should submit the request to transfer ownership by completing the Contact Us form. The following information is required to complete the measure transfer request.

- Name and organization of the current measure owner;
- Name and organization of the new measure owner;

- Written permission from the current measure owner if the current measure owner is not submitting the transfer request; and
- The full name of the measure(s) to be transferred.

The MAT Help Desk sends an email confirmation when the transfer of ownership is successfully completed. At the time the measure transfer is completed, a record of the transfer event will be recorded in the History log for the specified measure. The draft and all corresponding versions of the requested measure are transferred at the time of the request.

Only the new measure owner is permitted to edit the transferred measure unless he or she shares the measure with another MAT user.

For additional information regarding transfer of ownership, please view the recorded training session posted on the [Training & Resources page](#) of the public website.

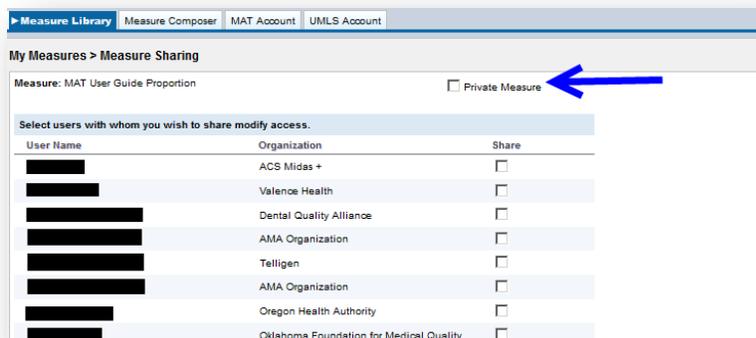
D. Designate a Measure as Private

Any version or draft of a measure can be designated as 'Private'. If a measure is designated as Private, only the measure owner and users who have been granted Modify-access to the measure are able to view and edit the measure.

The measure owner or any other user given Modify-access may change the measure status to 'Private'. Instructions to designate a measure version or draft as private are listed below.

1. Select the Share icon in the Measure Library for the desired measure version or draft.
2. Select the 'Private Measure' check box located in the upper, right corner of the Measure Sharing page.

Figure 60 Measure Sharing - Making Measure Private



3. Select the Save and Continue button located on the bottom, left side of the page.

E. Removing Private Designation from a Measure

The privacy designation can be removed from a measure by the measure owner or any user given Modify-access to the measure. To remove the Private designation from measure, complete the following steps.

1. Select the Share icon in the Measure Library measure list for the desired measure version or draft.
2. Deselect the 'Private Measure' check box located in the upper, right corner of the 'Measure Sharing' page.
3. Select the Save and Continue button located on the bottom, left side of the page.

Once the Private checkbox is deselected, all MAT users are provided Read-only access to the measure draft or versions, and the measure owner and users with Modify-access continue to be able to view and edit the measure.

X. CLONE

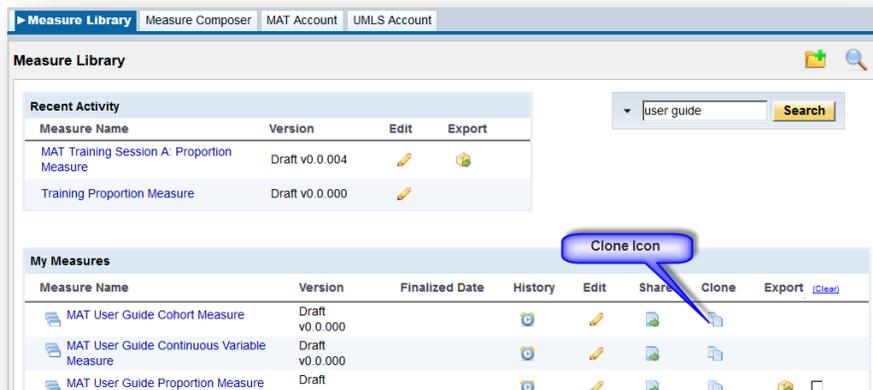
Cloning is a function that allows users to copy a measure, modify it, and save it as a new measure. The function helps users create measures with identical populations and/or denominators without the need to rebuild phrases and logic.

An active Clone icon appears for measures owned by the signed-in user. If the user accessing the measure is the measure owner, measure icons appear in the History, Edit, Share, and Clone columns to enable these functions. If the user accessing the measure is not the measure owner, the Share and Clone icons are gray and disabled. In addition, the Edit icon is present but disabled; and the History icon remains active and visible.

Cloned measures do not carry connection to the original measure. When a measure is cloned, users are prompted to edit the measure name, abbreviated name, and scoring. Changes made to the original measure after cloning are not automatically updated in the cloned measure.

- 1) Select the Clone icon.

Figure 61 Measure Library - Clone Icon



- 2) Provide a new identity for the cloned measure by entering a name, abbreviated name, and measure scoring for the new measure.

Figure 62 Renaming Cloned Measure

The screenshot shows a web-based interface for cloning a measure. The title bar includes 'Measure Library', 'Measure Composer', 'MAT Account', and 'UMLS Account'. The main content area is titled 'My Measures > Clone Measure' and shows the current measure being cloned: 'Measure: MAT User Guide Proportion'. Below this, there is a prompt: 'Enter a measure name and abbreviated name. Then continue to the Measure Composer. All fields are required.' There are three input fields: 'Name', 'Abbreviated Name', and 'Measure Scoring' (a dropdown menu currently showing 'Proportion'). A blue callout bubble with the text 'Enter a new Name and Abbreviated' points to the 'Name' field. At the bottom of the form are two buttons: 'Save and Continue' and 'Cancel'.

- 3) Select the Save and Continue button. User will automatically be directed to the Measure Details tab.
- 4) Users can now modify the logic and value sets of the cloned measure as needed.

Note: If the measure being cloned had previously been shared with other users, the share permissions are not applied to the cloned measure. If desired, the measure owner must share the cloned measure with desired users.

XI. DELETE A MEASURE

Measure owners are given the option to delete a measure version or draft. Once a measure version or draft is deleted from the Measure Authoring Tool, it is not recoverable. After deletion, the measure version or draft will not appear in the Measure Library list of measures.

Note: If the deleted measure is a component measure of a composite, it will be removed from the component measures list on the Measure Details page. The component measure will also be removed from the Simple XML, human readable, and HQMF exports.

Instructions to delete a measure version or draft from the MAT are provided below.

- 1) Select the draft or version name in the Measure Library.
- 2) Select the Measure Details tab.
- 3) Select the Delete Measure button positioned to the far right of the page.

Figure 63 Measure Details - Delete Measure

The following warning message displays:

Figure 64 Confirm Measure Deletion

- 4) Before proceeding, verify the draft or version is correct. Once password verification is complete, users will not be able to recover the deleted measure. Users may select the Cancel button at this time to stop the deletion process.
- 5) Enter your MAT password and select the Confirm button to delete the measure. A success message displays in the Measure Library.

XII. EXPORT

The last column in the Measure Library is labeled Export. The export function allows the user to retrieve the completed eMeasure and the related spreadsheet of value sets associated with it.

Once the measure creator packages the measure (referenced in the [Chapter 11 Measure Composer-Measure Packager](#) section of this user guide), an export icon and check box appear in the Export column of the Measure Library for that measure.

MAT version 3 measure packages are generated for any measure last packaged before July 25th, 2014. MAT versions 4.0 and above measure packages are generated for any measure last packaged after July 25th, 2014.

Measures packaged **before** the July 25th, 2014 release (MAT version 3) display the following icon:

Figure 65 Icon for Measures Packaged Before July 25th, 2014



Measures packaged **after** the July 25th, 2014 release (MAT version 4.0 and above) display the following icon.

Figure 66 Icon for Measures Packaged After July 25th, 2014



Note: Each export icon displays a tool tip if a user holds the mouse over it. The tool tip identifies the MAT version used to create the export files.

The measure creator or users who have been given shared permissions to edit the measure can package a measure to make it available for export. Any user can export a packaged measure. Users with whom the measure has been shared can create their own measure package and export the measure.

A measure can be ready for export before it is completed. A measure owner may choose to package a draft of a measure and view the export files before the measure is complete.

A measure can be exported with or without an active connection to the VSAC. For the VSAC value set data to be included in the measure package and measure export, an active connection is required.

Instructions for including the VSAC value set data in the measure package is provided in

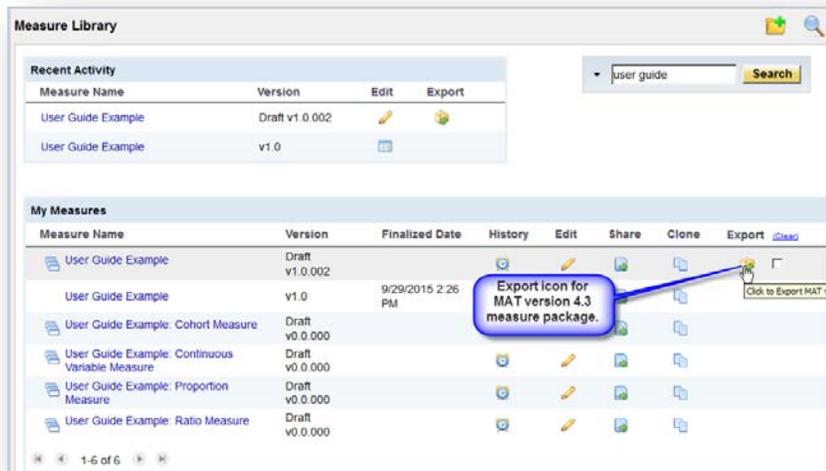
[Chapter 11 Measure Composer-Measure Packager.](#)

A. Export a Single Measure

The following provides instructions on how to export a measure.

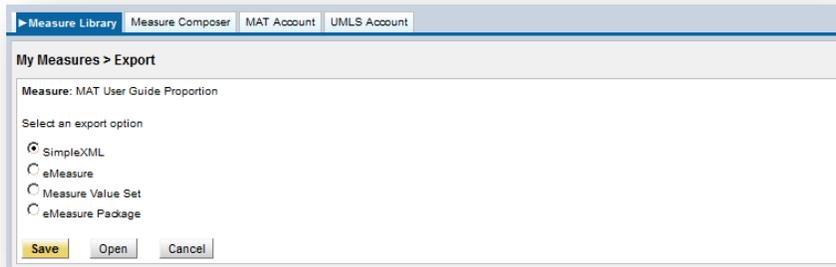
1. Select the Export icon. (To export one or more measures using the checkbox, follow the instructions for [Bulk Exports](#).)

Figure 67 Measure Library - Export Icon



2. Select the radio button on the next page for the desired output format.

Figure 68 Export Format Options



Export options include the SimpleXML, eMeasure (HTML human readable), Measure Value Set (value set Excel spreadsheet), or an eMeasure Package.

a) SimpleXML

The 'SimpleXML' option exports the measure in the fundamental green eMeasure XML syntax utilized by the MAT for describing eMeasures.

b) eMeasure

The 'eMeasure' option exports the measure in HQMF XML format. Accompanying the eMeasure is a file called a "Style Sheet" that allows the XML to open in a web browser in human-readable format. To view a sample of the HTML human readable, reference [Appendix D](#).

- To generate the HTML human-readable output of the eMeasure, select eMeasure and Open.

- To generate the HQMF XML version of the eMeasure, select eMeasure and Save.

c) Measure Value Set

The 'Measure Value Set' option exports in Excel format. It contains all value sets included in the measure, including the value set developer, their identifiers (OIDs), descriptive names, revision date, code system, code system version used, and all of the concepts in each value set as codes and with descriptors. The Measure Value Set spreadsheet is sorted by value set identified (OID) and secondarily sorted by code, numerically, and ascending.

The value set Excel spreadsheet only contains the VSAC value set data. The VSAC value set data is included in the value set Excel spreadsheet when the 'include VSAC value set data' checkbox is selected at the time the measure package is generated. If the 'include VSAC value set data' checkbox is not selected when a measure packaged is generated, the value set Excel spreadsheet is empty.

Note: The 'include VSAC value set data' check box must be selected and the measure repackaged if any changes are made to the included value sets since the last measure package.

The value set Excel spreadsheet contains all the VSAC value sets included in the measure when the measure package is created and the 'include VSAC data' is selected in the Measure Details. The value set Excel spreadsheet includes the value set developer(s), the value set OID(s), revision date, and value set name, code system, code system version, code, value set Version or Expansion Identifier, and descriptor. The output of the measure value set is in an Excel format. The first worksheet of the value set Excel spreadsheet displays the value sets used in the logic for that measure, sorted by value set identified (OID) and secondarily sorted by code, numerically, and ascending.

The second worksheet of the measure value set, the supplemental value set, contains the value sets, including the OIDs, codes, and code descriptors, for the supplemental data elements selected on the Measure Details.

Navigation Tip: For additional instructions on packaging a measure with or without the VSAC value set data, review [Chapter 11 Measure Composer – Measure Packager](#).

d) eMeasure Package

The output for the 'eMeasure Package' option is a zip file containing the following measure documents:

- a directory containing a style sheet for opening a human-readable version of the eMeasure,
- the SimpleXML,
- the HTML human readable,
- the value set Excel spreadsheet, and
- the HQMF eMeasure XML.

Figure 69 Measure Package Zip File Contents

Name	Type	Modified	Size	Ratio	
MATv430Sample_v4_3_eMeasure.xml	XML Document	9/25/2015 4:10 PM	52,733	88%	
MATv430Sample_v4_3_Fri Sep 25 16.10.21 CDT 2015.xls	Microsoft Of...	9/25/2015 4:10 PM	6,144	74%	
MATv430Sample_v4_3_HumanReadable.html	HTML File	9/25/2015 4:10 PM	18,903	82%	
MATv430Sample_v4_3_SimpleXML.xml	XML Document	9/25/2015 4:10 PM	14,061	74%	

By downloading and extracting the contents of the zip file to a single directory, a user can open a human-readable version of the eMeasure XML file or a SimpleXML file by selecting the eMeasure XML or Simple XML file name. Please note, the directory structure within the zip file should be maintained when extracting the documents to the user's system to download and extract the contents in a single directory. In addition, the user's browser system must be set up to read XML files.

The MAT supports Internet Explorer version 8.0 or above, or Firefox version 36 or above. Other browsers may be used, but they are not supported by the MAT at this time.

Note: When applicable, the MAT coordinates releases to coincide with QDM updates. The MAT version 3 measure packages contain measure logic using the QDM prior to the QDM version 4, MAT version 4 includes packages using the QDM version 4 through 4.1.2, MAT versions 4.3-4.5 use QDM version 4.2, and MAT version 4.6 uses QDM version 4.3.

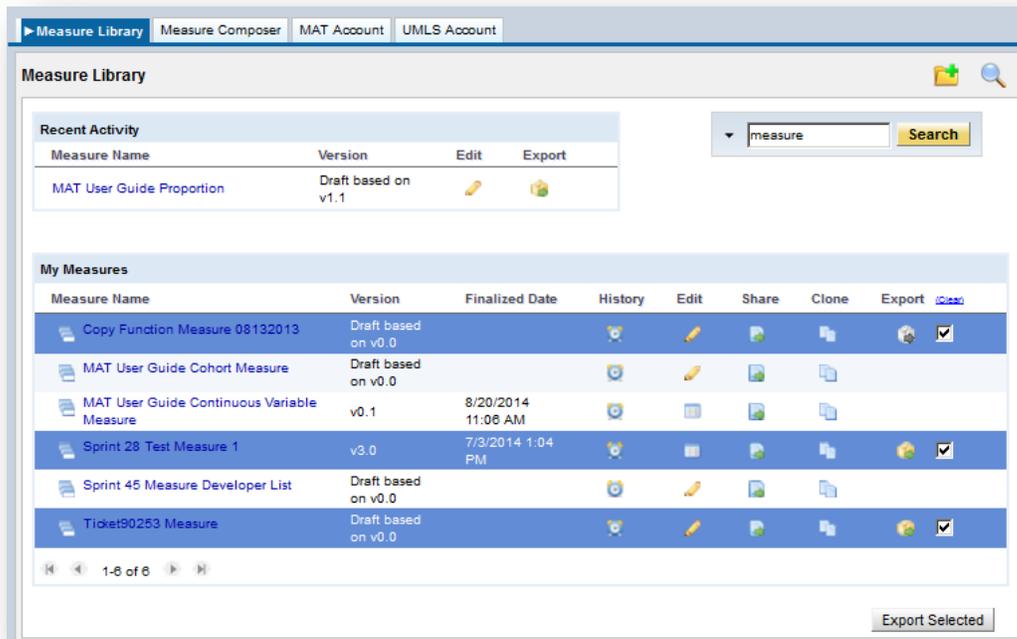
B. Bulk Measure Package Export

A user may select to export more than one measure package. A checkbox is present when a measure package is available for export. Select the check box for each measure package to be included in the export. Packages selected for a bulk measure package export may not exceed 90 Measures or 100MB.

To export multiple measure packages:

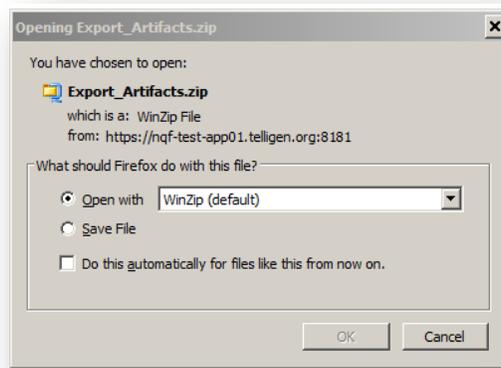
1. Select the desired measure packages by selecting the 'Export' checkboxes within the same row as the measures to be included in the export.
2. Next select the Export Selected button (gray) on the bottom, right of the page.

Figure 70 Measure Library - Three Measures Selected for Bulk Export



- Next, Open or Save the exported measures using the WinZip File.

Figure 71 Select Open or Save



- The selected eMeasure packages will be made available for use in a zip file.

Chapter 7: Measure Details

Chapter Overview: The Measure Details section allows users to define the metadata about their measures. This includes, but is not limited to, information such as the measure steward, author, measurement period, clinical rationale, references, and guidance. These details will comprise the header of the human-readable eMeasure.

Figure 72 Measure Composer - Measure Details

Metadata for the measure is entered into the Measure Details page. To save work on the Measure Details page, select the Save button in the bottom, left corner of the page. Upon successfully saving work, a confirmation message displays. If the user attempts to navigate from Measure Details without saving, the user is prompted to save changes with a warning message. Changes are not automatically saved.

The measure populations display dynamically in the Measure Details based on the measure scoring type selected for the measure. In other words, only description fields for eligible populations for a measure scoring type are viewed on the Measure Details page. To review the eligible measure populations for a specific scoring type, use the table in [Appendix C Measure Grouping Rules](#).

The information entered on the Measure Details page appears in the header section of the HQMF eMeasure file and HTML human-readable file.

As the information entered into the MAT is included in an HTML file in the eMeasure export file, all characters used should be HTML compatible. Any character that can be created using a keyboard

function and therefore directly entered into these fields will be compatible. However, use caution copying and pasting items from other sources because they could contain superscripts, subscripts or other non-HTML compatible characters (for example: ©, ®, and ™) that will cause error upon export.

Note: Although users can enter the measure details information at any time, all required fields must be completed in order for a measure to export a valid HQMF. All fields are not required to export a measure. This allows users to export a measure while the measure is still under construction.

Note: Users may first copy and paste the text into a Notepad document to remove most of the extraneous coding that may be present when copying from a Microsoft Word or Excel document.

I. EMEASURE TITLE

The eMeasure Title and eMeasure Abbreviated Title fields automatically display the names that were entered at the time the measure was created. These cannot be changed on the Measure Details page. To change the name or abbreviated name, select the edit icon for the measure on the Measure Library page. Detailed instructions can be found in the [Edit the Measure Name or Measure Scoring Type](#) section in this document.

II. MEASURE SCORING

The Measure Scoring field automatically displays the type of measure scoring which was entered at the time the measure was created. This cannot be changed on the Measure Details page. To change the type of measure scoring, select the edit icon for the measure on the Measure Library page.

III. EMEASURE IDENTIFIER (MEASURE AUTHORING TOOL)

The eMeasure Identifier (Measure Authoring Tool) field is optional. When ready to assign an eMeasure Identifier, the user can select the Generate Identifier button. This identifier will remain consistent throughout all versions and drafts of a measure. Once an eMeasure Identifier has been generated, the user will not be able to modify or remove it from any draft or version. The eMeasure identifier will be unique to that measure (and its versions or drafts); it will not be assigned by the MAT to any other measure.

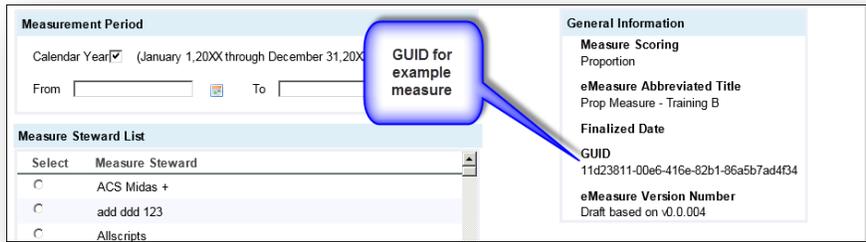
IV. FINALIZED DATE

The MAT assigns a date and time representing the Finalized Date of the measure when it was versioned. No date displays for measures in draft mode.

V. GUID (Globally Unique Identifier)

A GUID is assigned to the measure at creation. This identifier remains consistent throughout all versions and drafts of a measure. It is a unique identifier assigned by the MAT required by the HL7 HQMF standard.

Figure 73 Measure Details - GUID



VI. EMEASURE VERSION NUMBER

The eMeasure Version Number field is a read-only field. The eMeasure Version Number is assigned by MAT. The eMeasure Version Number has three components: The major version, minor version, followed by the number of times the measure version has been packaged. The number of times the selected measure has been packaged is called the revision number.

Note: In the unlikely circumstance that a measure draft or version is packaged 999 times, then the revision counter resets to zero.

VII. NATIONAL QUALITY FORUM (NQF) NUMBER

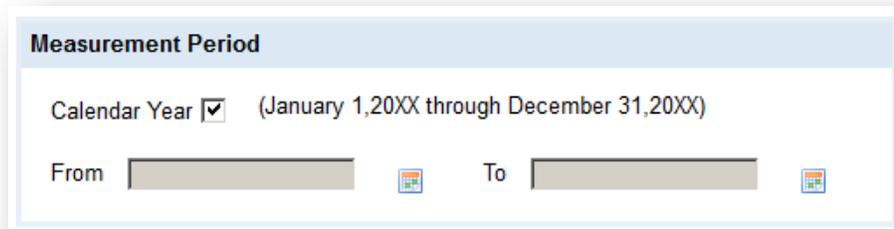
Enter the assigned NQF ID if the measure is NQF endorsed.

For eMeasures that do not have an NQF Number, enter “Not Applicable”.

VIII. MEASUREMENT PERIOD

The Measurement Period for all measures default to the calendar year and are represented as January 1, 20XX through December 31, 20XX in the HTML human readable.

Figure 74 Measure Details - Measurement Period

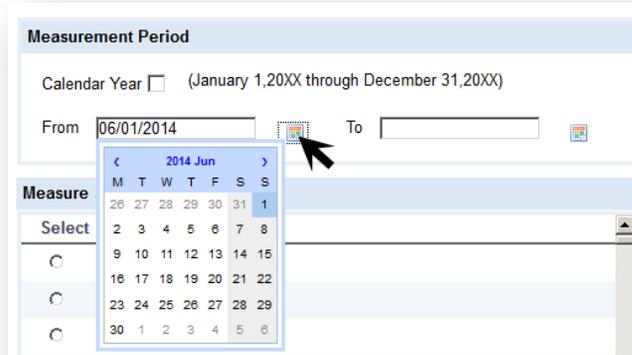


A measurement period other than the calendar year may be designated. To do so, complete the following steps.

- 1) Deselect the Calendar Year checkbox.

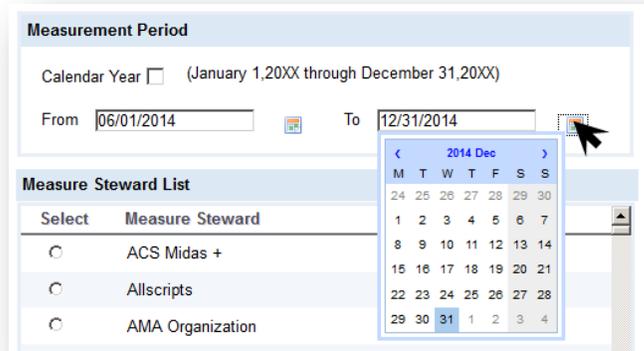
- 2) Select the calendar icon to the right of the 'From' input field and select the desired date. Or click in the 'From' box and type in the date for the Measurement Period in the format – "MM/DD/YYYY"

Figure 75 Specifying Calendar Start Date



- 3) Next, select the calendar icon to the right of the 'To' input field and select the desired date. Or click in the 'To' box and type in the date for the measurement period in the format – "MM/DD/YYYY"

Figure 76 Specifying Calendar End Date

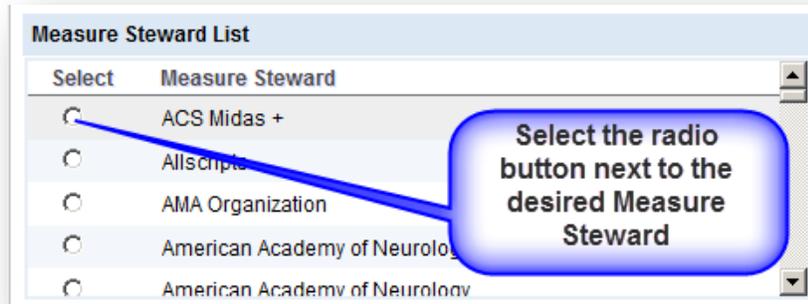


- 4) Select the Save button (yellow) at the bottom of the page to retain changes.

IX. MEASURE STEWARD

The Measure Steward is the organization responsible for the measure content and maintenance. Choose the desired Measure Steward by selecting the radio button to the left of the Measure Steward name. The selected Measure Steward appears at the top of the alphabetical list after the selection has been saved. To save the selected Measure Steward, select the Save button (yellow) at the bottom of the Measure Details page.

Figure 77 Measure Details - Measure Steward List



Note: If the desired organization does not appear in the Measure Steward list, submit a request to MAT Support to have the organization added. The request should include the full name of the organization and the organization's OID. An organization OID may be obtained from and registered on the HL7 OID registry, <https://www.hl7.org/oid/index.cfm>. If an organization OID is not available, a UUID will be assigned by the MAT Help Desk.

X. MEASURE DEVELOPER

The Measure Developer represents the organization that authored the quality measure. Choose the desired organization(s) by selecting the checkbox positioned to the left of the organization name.

The organization OID can be verified by hovering over the organization name in the alphabetical Measure Developer list. The selected Measure Developer(s) appears at the top of the alphabetical list after the selection has been saved. To save the selected Measure Developer(s), select the Save button (yellow) at the bottom of the Measure Details page.

Figure 78 Measure Details - Measure Developer List

Select	Measure Developer
<input type="checkbox"/>	ACS Midas +
<input type="checkbox"/>	Allscripts
<input type="checkbox"/>	AMA Organization
<input type="checkbox"/>	American Academy of Neurology
<input type="checkbox"/>	American Academy of Neurology

Note: If the desired organization does not appear in the Measure Developer list, submit a request to MAT Support to have the organization added. The request should include the full name of the organization and the organization's OID. An organization OID may be obtained from and registered on the HL7 OID registry, <https://www.hl7.org/oid/index.cfm>. If an organization OID is not available, a UUID will be assigned by the MAT Help Desk.

XI. ENDORSED BY NQF

Select the appropriate radio button to indicate whether or not the measure is currently endorsed by NQF. The user guide example measure is not endorsed by NQF; therefore, the radio button next to 'No' is selected.

Figure 79 Measure Details - Endorsed By NQF

Endorsed By NQF

No

Yes

XII. DESCRIPTION

Enter a general description of the measure intent.

Note: Users are encouraged to view the published measures stored in the CMS [eCQM library](#) to view examples of descriptions.

XIII. COPYRIGHT

Enter the organization(s) who own the intellectual property represented by the eMeasure.

For eMeasures that do not have copyright information, enter 'None'.

XIV. DISCLAIMER

Enter disclaimer information for the eMeasure.

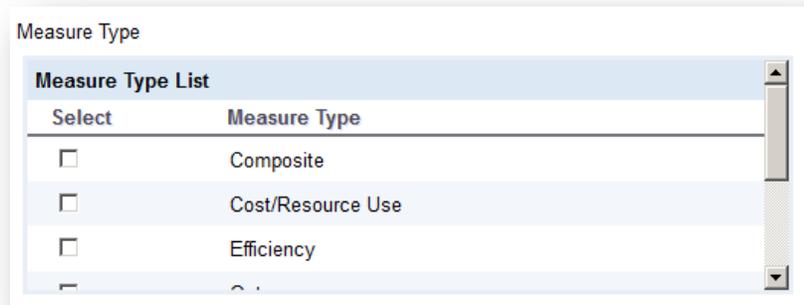
For eMeasures that do not have disclaimer information, enter 'None'.

XV. MEASURE TYPE

Select the appropriate Measure Type by selecting the checkbox to the right of one or more of the following measure types included in the Measure Type List on the Measure Details page:

- Composite
- Cost/Resource Use
- Efficiency
- Outcome
- Patient Engagement/Experience
- Process
- Structure

Figure 80 Measure Details - Measure Type



To deselect a previously added Measure Type, deselect the checkbox to the left of the Measure Type to be removed. Select the Save button (yellow) at the bottom of the Measure Details page to retain changes.

XVI. ITEMS COUNTED

An item count is a means to establish what the measure is counting. For example, if a measure is interested in an episode of care, using item count allows the measure developer to establish what episode(s) of care the measure is interested in. Item count is a concept introduced in the HQMF R2. MAT users are encouraged to contact workgroups at HL7 and/or the QDM MITRE team to obtain use cases for 'Item Count'.

An optional field 'Items Counted' is added to the Measure Details page. All QDM elements applied to the selected measure display in the alphabetical Items Counted list. Scroll through the list of QDM elements and select the desired QDM element to be used for 'Item Count' by selecting the checkbox positioned to the left of the QDM element name. The number of QDM elements selected for the item count is populated to the right of the 'Items Counted' list box.

Figure 81 Measure Details - Items Counted List

Items Counted List		
Select	Name	Datatype
<input type="checkbox"/>	Aspirin	Medication, Order
<input checked="" type="checkbox"/>	Home Healthcare Services	Encounter, Performed
<input type="checkbox"/>	Hypertension	Diagnosis, Active
<input checked="" type="checkbox"/>	Office Visit	Encounter, Performed

Selected Items: 2

After the selected QDM element(s) are saved, the selections are alphabetically listed at the top of the Items Counted list. The unselected QDM elements appear alphabetically following the selected QDM elements.

Figure 82 Measure Details - Items Counted (Selected QDM Elements)

Items Counted List		
Select	Name	Datatype
<input checked="" type="checkbox"/>	Home Healthcare Services	Encounter, Performed
<input checked="" type="checkbox"/>	Office Visit	Encounter, Performed
<input type="checkbox"/>	Aspirin	Medication, Order
<input type="checkbox"/>	Hypertension	Diagnosis, Active

Selected Items: 2

To remove a QDM element selected for an item count, deselect the checkbox to the left of the QDM element name. Select the Save button (yellow) at the bottom of the Measure Details page to retain all changes made to the 'Item Count List'.

XVII. COMPONENT MEASURES

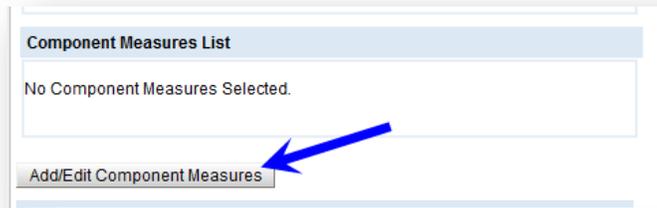
The Component Measures List within the Measure Details page allows users the option to add one or more component measures for the selected measure.

Measures constructed in the MAT may be composite measures. For composite measures, MAT users may add one or more component measures. Component measures serve as a reference point for understanding what comprises a composite measure.

Users are able to select component measures from a list of all measures accessible from the Component Measures List input field on the Measure Details page. All measures are listed in a table with the measure name, full version number, and finalized date, if applicable.

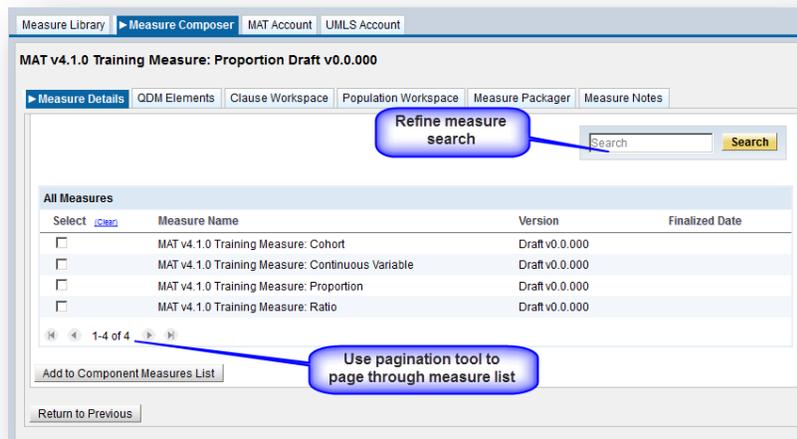
- 1) Under the section titled 'Component Measures List', select the Add/Edit Component Measure button (gray).

Figure 83 Measure Details - Add/Edit Component Measures



- 2) Users are navigated to a new page where all measures within the Measure Authoring Tool are listed. Twenty-five measures display at a time and users may page through the measures using the pagination tool at the bottom of the measures list or use the 'Search' tool in the upper, right corner of the page to refine the search with keyword(s).

Figure 84 Measure Details - List of Measures Eligible to be Selected as Component Measure



- 3) Select the checkbox next to the measure(s) to be added to the 'Component Measure List'.

Note: To remove a measure from the component measure list, deselect the corresponding checkbox. To clear all selected measures select the Clear button at the top of the first column next to the word 'Select'.

- 4) Next select the Add to Component Measures List button (gray).
- 5) A success message (green background) will display.
- 6) Now, select the Return to Previous button (gray) displayed on the bottom, right corner of the page below the Add to Component Measures List button (gray). All measures added or removed will now be reflected in the 'Component Measure List' on the Measure Details page.

- 7) Select the Save button (yellow) at the bottom of the Measure Details page to retain the changes made to the list of component measures. Users will receive a success message when changes are saved successfully.

Note: Measures may be removed from the component measure list on the Measure Details page by deselecting the checkbox next to the measure name. To retain changes, select the Save button.

XVIII. STRATIFICATION

Enter information that describes the strata for which the measure is to be evaluated.

For eMeasures that do not have stratification information, enter 'None.'

XIX. RISK ADJUSTMENT

Enter a description of the risk adjustment for the eMeasure. Risk adjustment is the method of adjusting for clinical severity and conditions present at the start of care that can influence patient outcomes for making valid comparisons of outcome measures across providers. This field indicates whether an eMeasure is subject to the statistical process for reducing, removing, or clarifying the influences of confounding factors to allow more useful comparisons.

For eMeasures that do not have risk adjustment information, enter 'None'.

XX. RATE AGGREGATION

Enter a description of the rate aggregation for the eMeasure. Rate aggregation describes how to combine information calculated based on logic in each of several populations into one summarized result. It can also be used to describe how to risk adjust the data based on supplemental data elements described in the eMeasure.

For eMeasures that do not have rate aggregation, enter 'None'.

XXI. RATIONALE

Enter a general description of the evidence used to create the measure. The Rationale should be a succinct statement of the need for the measure. This usually includes statements pertaining to importance criterion such as impact, gap in care and evidence.

Examples of rationale statements can be reviewed in the human readable of published measures by accessing the CMS [eCQM library](#).

XXII. CLINICAL RECOMMENDATION STATEMENT

Enter a Clinical Recommendation Statement or general advice regarding the measure and its content developed by the expert panel that created the measure. The Clinical Recommendation Statement is a summary of relevant clinical guidelines or other clinical recommendations supporting the eMeasure.

XXIII. IMPROVEMENT NOTATION

Enter information that indicates whether an increase or decrease in the score is the preferred result (e.g., higher score indicates better quality).

XXIV. REFERENCE(S)

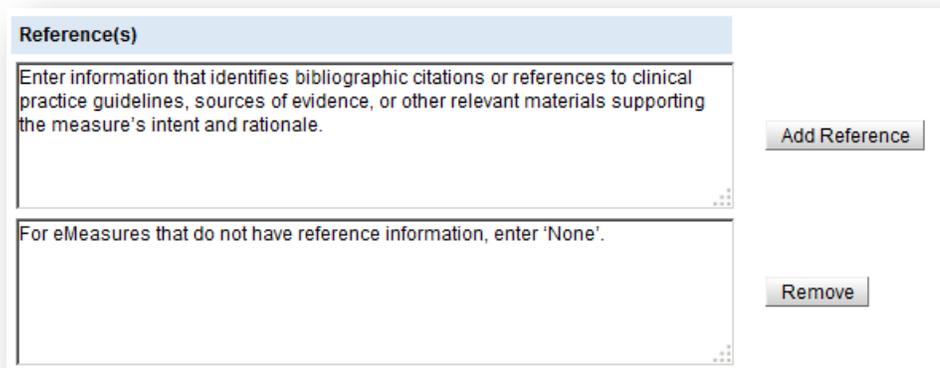
Enter information that identifies bibliographic citations or references to clinical practice guidelines, sources of evidence, or other relevant materials supporting the measure’s intent and rationale.

To add more than one reference, select the Add Reference button (gray) to the right of the reference box. To remove a reference, select the Remove button (gray) to the right of the reference to be deleted.

For eMeasures that do not have reference information, enter ‘None’.

Note: Please keep in mind, each reference should be added separately for references to appear as separate rows in the eMeasure output.

Figure 85 Measure Details - References



XXV. DEFINITION

Enter a definition or description of individual terms, if needed. For measures that do not have definition information, enter ‘None’.

XXVI. GUIDANCE

Enter important information about how to interpret or implement certain components of the measure. Implementers can reference the guidance section for additional information about the data elements, logic, and timing of the measure’s specifications.

Note: It is recommended that use of the Guidance section is limited, as this information must be manually interpreted before implementation.

For Measures that do not have guidance information, enter ‘None’.

XXVII. TRANSMISSION FORMAT

Enter URLs that provide the transmission formats that are specified for a particular reporting program.

For measures that do not have Transmission Format information enter 'None'.

XXVIII. INITIAL POPULATION

Enter a description of the initial population for the eMeasure.

The initial population refers to all patients to be evaluated by a specific performance eMeasure. The initial population shares a common set of specified characteristics within a specific measurement set to which a given measure belongs. Details often include information based upon specific age groups, diagnoses, diagnostic and procedure codes, and enrollment periods. Initial Population is a population type included in all four measure scoring types: proportion, ratio, continuous variable, and cohort.

XXIX. DENOMINATOR

Enter a description of the Denominator for the eMeasure.

It can be the same as the initial population or a subset of the initial population, serving as a method to further constrain the population for the purpose of the eMeasure. Different measures within an eMeasure set may have different denominators. Measures with the measure scoring types of proportion or ratio have denominator(s). Continuous variable eMeasures do not have a denominator, but instead define a measure population.

XXX. DENOMINATOR EXCLUSIONS

Enter a description of the Denominator Exclusions for the eMeasure.

Denominator Exclusions are patients who should be removed from the eMeasure population and denominator before determining if numerator criteria are met. Denominator exclusions are used in proportion and ratio measures to help narrow the denominator.

XXXI. NUMERATOR

Enter a description of the Numerator(s) for the eMeasure.

Numerators are used in proportion and ratio eMeasures. In proportion measures the numerator criteria are the processes or outcomes expected for each patient, procedure, or other unit of measurement defined in the denominator. In ratio measures the numerator is related, but not directly derived from the denominator.

XXXII. NUMERATOR EXCLUSIONS

Enter a description of the numerator exclusions for the eMeasure.

Numerator Exclusions are used in ratio and proportion measures to define instances that should not be included in the numerator data.

XXXIII. DENOMINATOR EXCEPTIONS

Enter a description of the denominator exceptions for the eMeasure.

Denominator exceptions are those conditions that should remove a patient, procedure or unit of measurement from the denominator only if the numerator criteria are not met. Denominator exceptions allow for adjustment of the calculated score for those providers with higher risk populations. Denominator exceptions are used only in proportion eMeasures. They are not appropriate for ratio, continuous variable, or cohort eMeasures.

Denominator exceptions allow for the exercise of clinical judgment and should be specifically defined where capturing the information in a structured manner fits the clinical workflow. Generic denominator exception reasons used in proportion eMeasures fall into three general categories: medical reasons, patients' reasons, and system reasons.

For proportion measures that do not have denominator exceptions, enter 'None'.

XXXIV. MEASURE POPULATION

Enter a description of the measure population for the eMeasure.

Measure population is used only in continuous variable eMeasures. It is a narrative description of the eMeasure population (e.g., all patients seen in the Emergency Department during the measurement period).

XXXV. MEASURE POPULATION EXCLUSIONS

Enter a description of the measure population exclusion for the eMeasure.

Measure population exclusions are used only in continuous variable eMeasures. It is a narrative description of the eMeasure population to exclude.

XXXVI. MEASURE OBSERVATION

Enter a description of the measure observations for the eMeasure.

Measure observations are used only in continuous variable and ratio measures. They provide the description of how to evaluate performance. Measure observations are generally described using a statistical methodology such as: count, etc.

XXXVII. SUPPLEMENTAL DATA ELEMENTS

Enter a description of the supplemental data elements for the eMeasure.

CMS defines four required supplemental data elements (payer, ethnicity, race, and ONC Administrative Sex), which are used to aggregate data into various subgroups. Comparison of results across strata can be used to show where disparities exist or where there is a need to expose differences in results.

Additional supplemental data elements required for risk adjustment or other purposes of data aggregation can be included in the Supplemental Data Element section.

For measures that do not have supplemental data elements, enter 'None'.

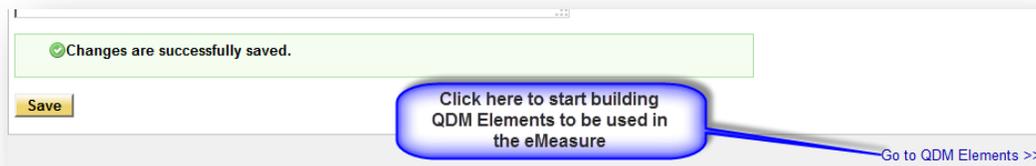
XXXVIII. MEASURE SET

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" or "Not applicable".

Upon saving information entered in the Measure Details page successfully, select 'Go To QDM Elements' to proceed with building and applying QDM elements, which is the first step in constructing the system clauses and logic in the measure.

Figure 86 Go to QDM Elements Navigation Tool

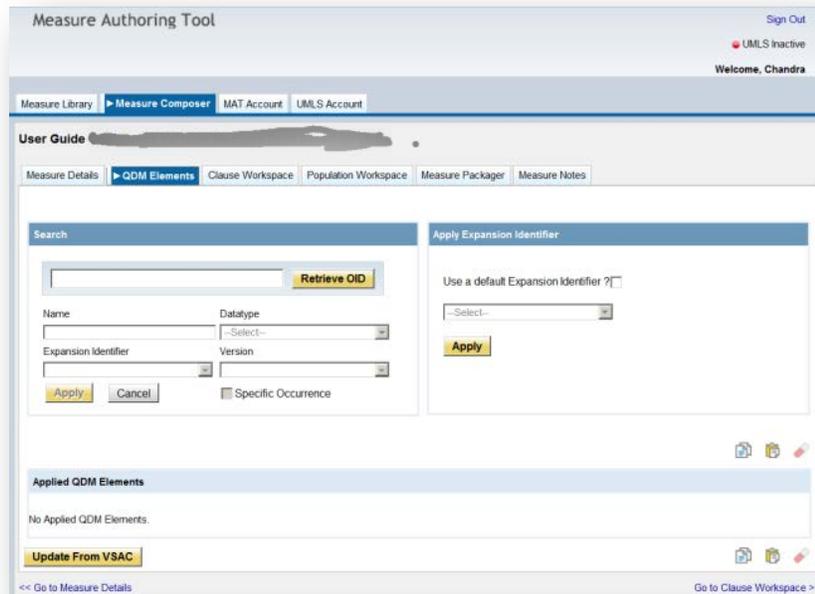


Chapter 8: Measure Composer—QDM Elements

Chapter Overview: This chapter describes the QDM Elements page features. Users are guided through the steps of constructing a QDM element with or without the VSAC value set data to be used within the measure logic of the Clause Workspace. Users will become familiarized with the additional features of updating applied QDM elements with current VSAC data, removing unused QDM elements, modifying existing QDM elements and adding, removing, or modifying attribute value sets, and copying applied QDM elements and/or attributes to another measure.

The QDM Elements page provides the measure developer with the ability to use the Value Set Authority Center value set data to build QDM elements and attributes and then add them to the measure.

Figure 87 Measure Composer - QDM Elements Tab



When accessing the QDM Elements page, users see a box in the upper left-hand corner with a blue banner that says 'Search'. This is where QDM elements and attributes are constructed and applied to the eMeasure. A box in the upper right hand corner with a blue banner that says 'Apply Expansion Identifier'. This feature is used to apply a default Expansion Identifier to all applied QDM elements and attributes. The Applied QDM Elements list is located just below these two boxes. The Applied QDM

Elements list contains all the QDM elements and attributes added to the eMeasure. Below the QDM elements list is the yellow Update From VSAC button.

Three icons are positioned above and below the QDM elements list and are used for copy and pasting QDM elements and attributes from one measure to another. At the bottom of the page navigation tools to take the user to the Measure Details or to the Clause Workspace.

The following functions and features are available to users on the QDM Elements page:

- Retrieve a value set from the VSAC to create a QDM element to be applied to the measure,
- Name a 'User-defined' QDM element when the value set OID is unknown or the VSAC API is not accessible,
- Select a datatype to for the retrieved value set when building a QDM element,
- Add a value set to the measure as an attribute,
- Select a specific Expansion Identifier or Version of a value set to be applied to the eMeasure,
- Create a Specific Occurrence of a QDM element,
- Apply the constructed QDM element or attribute to the Applied QDM Elements list,
- Modify a QDM element or attribute applied to the eMeasure,
- Delete a QDM element or attribute applied to the eMeasure,
- Apply a default Expansion Identifier to all applied QDM elements and attributes,
- Edit or remove the default Expansion Identifier,
- Update the list of applied QDM elements and attributes,
- Validate the OIDs and datatypes applied to the eMeasure, and
- Copy and paste QDM element and attributes from one measure to another.

Each of these features and functionality are reviewed in detail throughout this chapter.

I. ADDING A QDM ELEMENT

Value sets are used to define the clinical concepts for QDM elements used in eMeasures. For a measure to be published or used for reporting, all QDM elements must contain valid value set data. Value set data is maintained and stored within the Value Set Authority Center (VSAC). Additional information about the VSAC is located in [Chapter 5 Integrating with the VSAC](#).

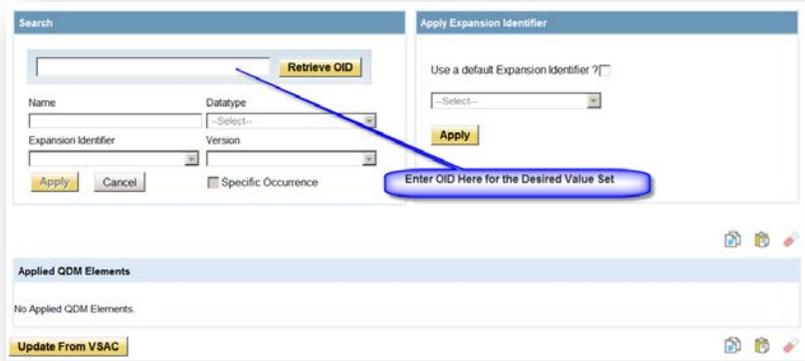
Instructions to create a QDM element with a VSAC value set and apply to a measure for use in the measure logic are provided below.

For this example, the QDM element Pregnancy: Diagnosis (using the grouping value set for pregnancy with the OID 2.16.840.1.113883.3.526.3.378) is being applied to a sample measure.

- 1) Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
- 2) Verify an active connection to the VSAC API is established.

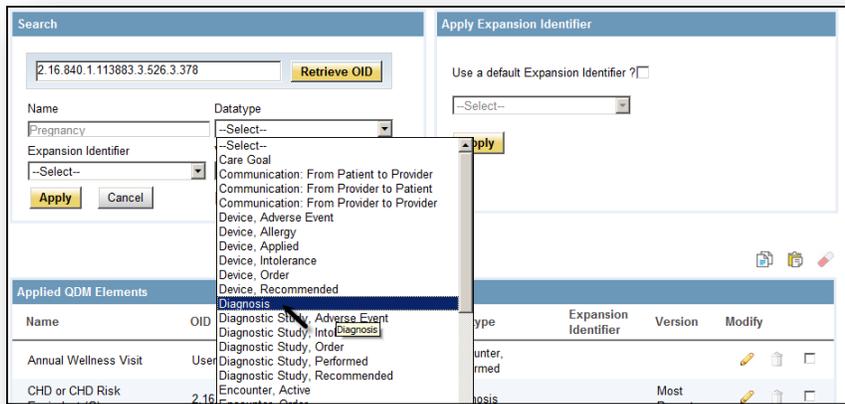
- 3) Enter the OID for the desired value set.

Figure 88 Adding QDM Element - Enter OID



- 4) Select the yellow Retrieve OID button.
- 5) Verify the desired value set populates in the name field. Also notice a success message is displayed.
- 6) From the datatype dropdown box, select the desired datatype.

Figure 89 Adding QDM Element - Select Datatype



- 7) Select the yellow Apply button.

Figure 90 Adding QDM Element - Select Apply

Name	OID	Datatype	Expansion Identifier	Version	Modify
Acute Myocardial Infarction (G)	2.16.840.1.113883.3.464.1003.104.12.1001	Diagnosis, Resolved		Most Recent	
Acute Myocardial Infarction (E)	2.16.840.1.113883.3.464.1003.104.11.1001	Diagnosis		Most Recent	

- 8) Verify the QDM element displays in the Applied QDM Elements list and a green success message displays confirming the QDM element has been added.

Figure 91 Success Message - QDM Element Added

Name	OID	Datatype	Expansion Identifier	Version	Modify
Pregnancy (G)	2.16.840.1.113883.3.526.3.378	Diagnosis		Most Recent	

Note: A '(G)' is displayed after the value set (Pregnancy, OID 2.16.840.1.113883.3.526.3.378) to denote a grouping value set. An '(E)' denotes an extensional value set. User-defined QDM elements or attributes do not display an '(E)' or '(G)'.

Navigation Tip: After all desired QDM elements and attributes are added to the Applied QDM elements list, proceed to the Clause Workspace page to build measure clauses. Instructions for building measure clauses can be found in [Chapter 9: Measure Composer – Clause Workspace](#).

II. ADDING A USER DEFINED QDM ELEMENT

MAT users have an additional option of building QDM elements without the VSAC value set data. This is a **temporary** solution to allow measure developers to continue to work on measure logic even in situations where the value set for QDM creation is not identified or there is a planned or unplanned interruption in the connection to the VSAC. The user guide and the MAT tool use the term ‘User defined’ to identify QDM elements created without the VSAC value set data. The ‘User-defined’ QDM element or attribute acts as a placeholder, until the desired OID for a specific VSAC value set is entered. The following instructions describe how to add a ‘User-defined’ QDM element.

Note: Once the value set OID is known or connection to the VSAC API is re-established, the ‘User-defined’ QDM element used in measure logic may be modified.

Refer to the section titled [Modifying an Applied QDM Element or Attribute](#).

For this example, a ‘User-defined’ QDM element named Home Visit: Encounter, Performed will be added to the Applied QDM Elements list.

- 1) To add a ‘User-defined’ QDM element or attribute, enter a temporary name for the QDM element or attribute into the ‘Name’ input field for the QDM element creation box in the upper left-hand corner of the QDM Elements page. The temporary naming structure is at the discretion of the measure developer and his or her organization.

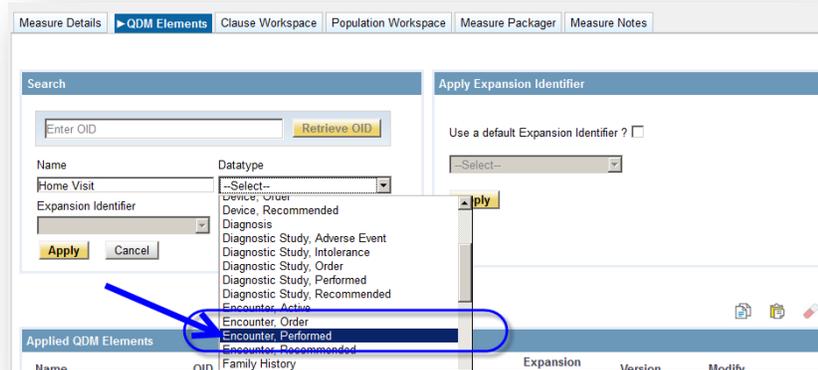
Note: The temporary name for this QDM element is “Home Visit” The temporary name may not contain the following characters: + * : - | ! ; %

Figure 92 Adding User-defined QDM Element - Enter Name

The screenshot shows the 'QDM Elements' page with a dialog box for adding a new element. The dialog has a 'Search' section with a text input and a 'Retrieve OID' button. Below that, there are fields for 'Name' (containing 'Home Visit'), 'Datatype' (a dropdown menu), 'Expansion Identifier', and 'Version'. There are 'Apply' and 'Cancel' buttons, and a checkbox for 'Specific Occurrence'. A blue callout box with a white border points to the 'Name' field and contains the text: 'Type in "User-Defined" QDM Element Name Here.'

- 2) From the datatype dropdown box select desired datatype.

Figure 93 Adding User-defined QDM Element - Select Datatype



- 3) Select the yellow Apply button located just below the Expansion Identifier dropdown box.
- 4) Verify a success message displays, and the 'User-defined' QDM element is populated in the Applied QDM Elements list located at the bottom half of the QDM Elements page.

Note: There is no OID listed for a 'User-defined' QDM element. The temporary name does not denote an extensional or grouping value set, as the QDM element/attribute is created without a VSAC value set. The Version and Expansion Identifier columns remain empty for 'User-defined' QDM elements and attributes.

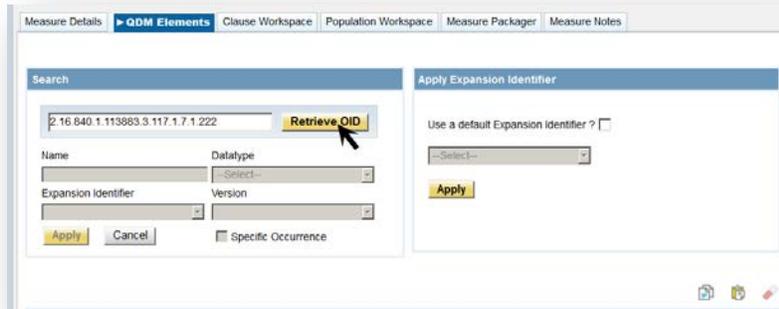
III. ADDING AN ATTRIBUTE

Attributes provide additional information about a measure element that further define the context expected (e.g., route for medications, admission time for encounters, etc.). Attributes that often require value sets are those used to define results of other activities such as results of procedures, laboratory tests, non-laboratory diagnostic tests, or physical examinations (e.g. left bundle branch block as the result attribute of the diagnostic test electrocardiogram). Attribute value sets also can be used to further specify details about a data element such as the severity of a diagnoses (e.g., persistent as a severity attribute of the diagnosis asthma).

A user may desire to add a value set to a measure as an attribute. This example applies the value set *Intravenous route (OID 2.16.840.1.113883.3.117.1.7.1.222)* as an attribute.

- 1) Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
- 2) Verify an active connection to the VSAC API is established.
- 3) Enter the OID for the desired value set. (*OID 2.16.840.1.113883.3.117.1.7.1.222*).
- 4) Select the yellow Retrieve OID button.

Figure 94 Adding an Attribute - Retrieve OID



- 5) From the Datatype dropdown box, select 'Attribute' which is the last selection in the list of datatypes.
- 6) Select the yellow Apply button.
- 7) Confirm a success message displays, and the attribute is present in the Applied QDM Elements list.

IV. REQUESTING A SPECIFIC VALUE SET VERSION OR EXPANSION IDENTIFIER

When adding a QDM element or attribute using a VSAC value set, the user may need to identify a specific Expansion Identifier or Version for the selected value set.

The VSAC refers to the list of codes or concepts that belong to a value set as the Expanded Code List of the value set, or simply expansion. The term 'expansion' refers to the process of applying a value set's definition against a version of a code system. Based on the value set's definition, the resulting expanded code list may change as the underlying code system updates its codes.

The VSAC computes value set expansions from the value set definitions, created by authors in the "VSAC Authoring Tool," using an author-designated expansion profile of specified code system versions. The default expansion profile consists of the most recent code system versions available in VSAC. In other words, value set expansions are snapshots-in-time of value set definitions computed by VSAC using a specified code system version.

"Expansion Identifier" is synonymous with what the VSAC refers to as an "Expansion Profile" in its GUI. This is what value set authors pick when they get ready to validate the individual codes or concepts in their value set.

Note: When an "Expansion Identifier" is applied to a QDM Element in the MAT, the value set API request that is sent from the MAT to the VSAC for the value set(s) are for draft value sets. These are the value sets that measure authors would be currently working on in the VSAC - not those that have already been published. To gain access to a specific value set's data that uses a particular expansion profile in draft status, the user must specify the "Expansion Identifier" that equates to the respective "Expansion Profile" on VSAC.

If a value set Expansion Identifier or Version is not selected, the MAT retrieves the MOST RECENT value set data for that OID from the VSAC.

The following example applies the QDM element *Office Visit: Encounter, Performed* (2.16.840.1.113883.3.464.1003.101.12.1001) with the Expansion Identifier of MU2 Update 2015-05-01.

- 1) Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
- 2) Verify an active connect to the VSAC API is established.
- 3) Enter the OID for the desired value set. (2.16.840.1.113883.3.464.1003.101.12.1001)
- 4) Select the yellow Retrieve OID button.
- 5) Select the desired datatype from the Datatype dropdown box. (Encounter, Performed)
- 6) Select the desired Expansion Identifier or Version. (MU2 Update 2015-05-01)

Figure 95 Value Set Expansion Identifier

Search

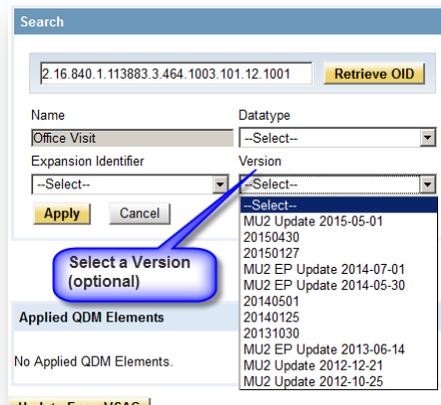
2.16.840.1.113883.3.464.1003.101.12.1001 Retrieve OID

Name	Datatype
Office Visit	--Select--
Expansion Identifier	Version
--Select--	--Select--
--Select--	<input type="checkbox"/> Specific Occurrence

VSAC Auto Expansion
 MU2 Update 2015-05-01
 MU2 EP Update 2014-05-30
 MU2 EH Update 2014-04-01
 MU2 EP Update 2013-06-14
 MU2 EH Update 2013-04-01
 MU2 Update 2012-12-21
 MU2 Update 2012-10-25

No Applied QDM Elements

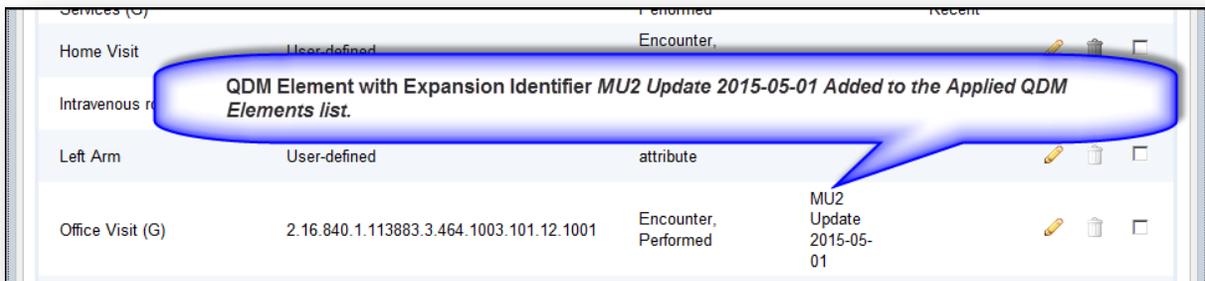
Figure 96 Value Set Version



Note: If a default Expansion Identifier is selected, the selected default Expansion Identifier is populated, and the user is prevented from selecting a different Expansion Identifier or Version when editing or adding an individual element.

- 7) Select the yellow Apply button.
- 8) Confirm a success message displays, and the QDM element or attribute is present in the Applied QDM Elements list.

Figure 97 Expansion Identifier MU2 2015-05-01 Added



V. CREATING A SPECIFIC OCCURRENCE OF A QDM ELEMENT

A user may want to specify a specific occurrence of a data element by selecting the checkbox 'Specific Occurrence' when building a QDM element with a VSAC value set.

The MAT allows the measure developer to indicate a single occurrence that is repeated through the measure logic. If the 'Specific Occurrence' option is not selected when creating a data element, the words Occurrence A will not display. As a result, any reference to that QDM data element will indicate

that any reference to it in the clinical record in the defined time frame is acceptable to meet the criteria of the measure.

In the following example the QDM element being applied in this example is *Occurrence A of General or Neuraxial Anesthesia: Procedure, Performed* with the OID 2.16.840.1.113883.3.117.1.7.1.254.

- 1) Select the QDM Elements page in the measure authoring tool by selecting the **QDM Elements** tab.
- 2) Verify an active connect to the VSAC API is established.
- 3) Enter the OID for the desired value set. (2.16.840.1.113883.3.117.1.7.1.254)
- 4) Select the yellow Retrieve OID button.
- 5) Select the desired datatype from the Datatype dropdown box. (Procedure, Performed)

Note: Value sets with a category of 'attribute' do not allow the selection of a specific occurrence.

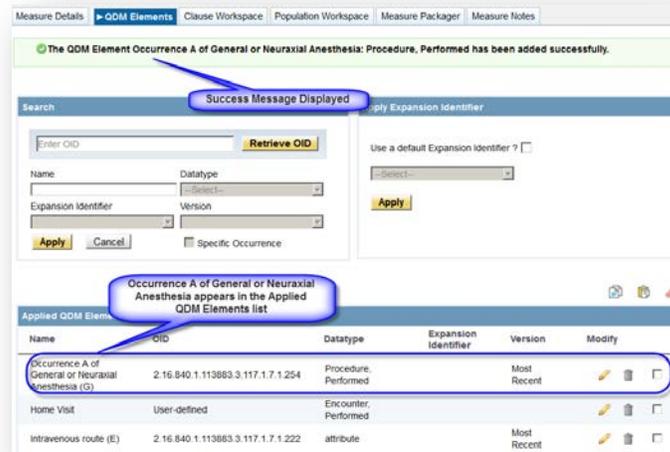
- 6) Select an Expansion Identifier or Version using the dropdown boxes, if applicable.
- 7) Select the checkbox next to the text 'Specific Occurrence', which is located next to the Version dropdown box.

Figure 98 Designating Specific Occurrence

The screenshot shows the 'QDM Elements' tab in the Measure Authoring Tool. The 'Search' section has a text input field containing the OID '2.16.840.1.113883.3.117.1.7.1.254' and a yellow 'Retrieve OID' button. Below the search section, there are two rows of dropdown menus: 'Name' (General or Neuraxial Anesthesia) and 'Datatype' (Procedure, Performed); 'Expansion Identifier' (--Select--) and 'Version' (--Select--). At the bottom left are 'Apply' and 'Cancel' buttons. At the bottom right is a checkbox labeled 'Specific Occurrence' with a blue arrow pointing to it.

- 8) Select the yellow Apply button.
- 9) Confirm a success message displays, and the QDM element is present in the Applied QDM Elements list.

Figure 99 Success Message - QDM with Specific Occurrence Added



- 10) To create additional occurrences A for the same value set and datatype combination, repeat the steps 1-9. For subsequently created occurrences of the same value set and datatype, the next available letter (e.g., B) is assigned to represent that occurrence.

Note: When creating a 'User-defined' QDM element, users are not provided the option of applying the occurrence. The 'User-defined' name of the temporary QDM element should be descriptive enough to identify the desired occurrence (i.e. A, B, or C). For example, the user defined QDM element name may be Occurrence A of Home Visit or Occurrence B of Home Visit.

VI. MODIFYING AN APPLIED QDM ELEMENT OR ATTRIBUTE

Once a QDM element or attribute is added to the Applied QDM Elements list, a user may wish to modify that QDM element or attribute. To be able to edit an applied QDM element or attribute, the signed-in user must be the measure owner or be provided 'Modify-access' to the eMeasure. The pencil icon does not appear in the Applied QDM Elements list for 'Read-only' measures.

The following modifications can be performed using the edit tool (pencil icon) for a specific QDM element or attribute.

- Modify OID
- Modify datatype
- Modify a user-defined QDM element
- Modify Version or Expansion Identifier
- Modify the Specific Occurrence of a QDM element

A. Modify OID

Complete the following steps to modify an OID for a QDM element or attribute applied to the eMeasure. The following example will change the OID for the QDM element *Office Visit: Encounter, Performed* OID 2.16.840.1.113883.3.464.1003.101.12.1001 (Grouping) to 2.16.840.1.113883.3.464.1003.101.11.1005 (Extensional)

1. Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
2. Verify an active connect to the VSAC API is established.
3. Select the pencil icon found in the same row of the QDM element to be modified in the Applied QDM Elements list.

Figure 100 Modifying Applied QDM Element - Edit Icon

Name	OID	Datatype	Expansion Identifier	Version	Modify
Occurrence A of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence C of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Home Visit	User-defined	Encounter, Performed			  <input type="checkbox"/>
Intravenous route (E)	2.16.840.1.113883.3.117.1.7.1.222	attribute		Most Recent	  <input type="checkbox"/>
Office Visit (G)	2.16.840.1.113883.3.464.1003.101.12.1001	Encounter, Performed		Most Recent	  <input type="checkbox"/>

1-6 of 6

Update From VSAC

4. Verify the QDM element OID is populated in the QDM element creation box in the upper left hand corner of the QDM Elements page, and the following text is displayed in the blue banner above the OID retrieval field, “Modify Applied QDM (QDM Element Name: Category, Datatype)”.

Figure 101 Modifying Applied QDM Element - QDM Element Selected

The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified.

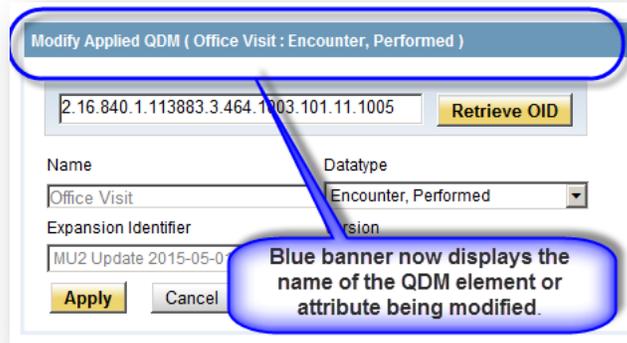
5. Enter the desired OID into the OID input field and select the yellow Retrieve OID button. A success message displays and the new value set information is retrieved from the VSAC.
6. Select the yellow Apply button and verify a success message displays and the new OID is represented in the Applied QDM Elements list.

B. Modify Datatype

The following example will change the datatype for the QDM element *Office Visit: Encounter, Performed* to *Office Visit: Encounter, Order*.

1. Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
2. Verify an active connect to the VSAC API is established.
3. Select the pencil icon found in the same row of the QDM element to be modified in the Applied QDM Elements list.
4. Verify the QDM element OID is populated in the QDM element creation box in the upper left hand corner of the QDM Elements page, and the following text is displayed in the blue banner above the OID retrieval field, “Modify Applied QDM (QDM Element Name: Category, Datatype)”.

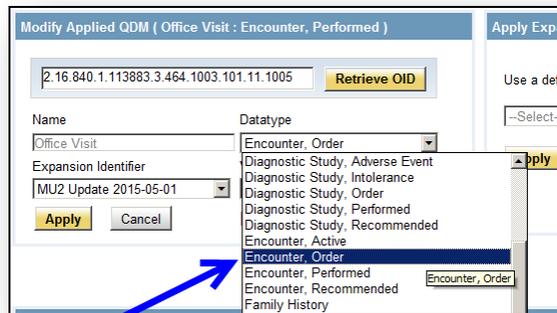
Figure 102 QDM Element to be Modified Displayed



Note: The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified.

5. Select the yellow Retrieve OID button. A success message displays and the new value set information is retrieved from the VSAC.
6. Select the new desired datatype from the Datatype dropdown box. (Encounter, Order)

Figure 103 Modify Datatype - Select New Datatype



7. Select the yellow Apply button and verify a success message displays and the new OID is represented in the Applied QDM Elements list.

Note: A value set with an attribute category can only be modified with another value set with an attribute category. Users will receive an error message when attempting to replace an attribute value set with a value set containing a non-attribute category.

C. Modify a User-defined QDM element

The following example will show how the user-defined QDM element named Home Visit: Encounter, Performed is updated to include VSAC value set data.

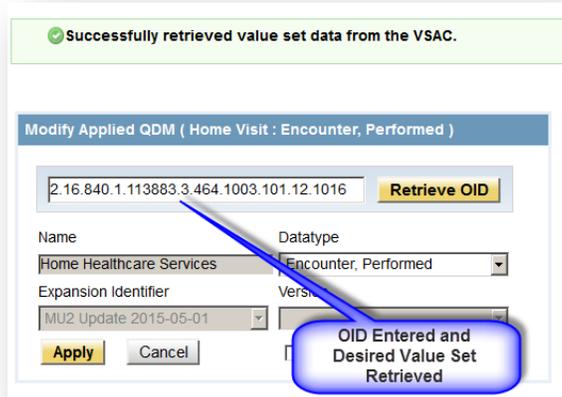
1. Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
2. Verify an active connect to the VSAC API is established.
3. Select the pencil icon found in the same row of the QDM element to be modified in the Applied QDM Elements list.
4. Verify the 'User-defined' QDM element name populates in the QDM element creation box in the upper left hand corner of the QDM Elements page, and the following text displays in the blue banner above the OID retrieval field, "Modify Applied QDM (QDM Element Name: Category, Datatype)".

Figure 104 Modifying User-defined QDM Element - QDM Element Selected

Note: The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified.

5. Enter the OID for the desired value set. (This example replaces the 'User-defined' QDM element Home Visit: Encounter, Performed with the QDM element Home Healthcare Services (OID 2.16.840.1.113883.3.464.1003.101.12.1016): Encounter, Performed.)
6. Select the yellow Retrieve OID button and verify a success message displays and the new value set information is retrieved from the VSAC.

Figure 105 Success Message - Value Set Data Retrieved from VSAC

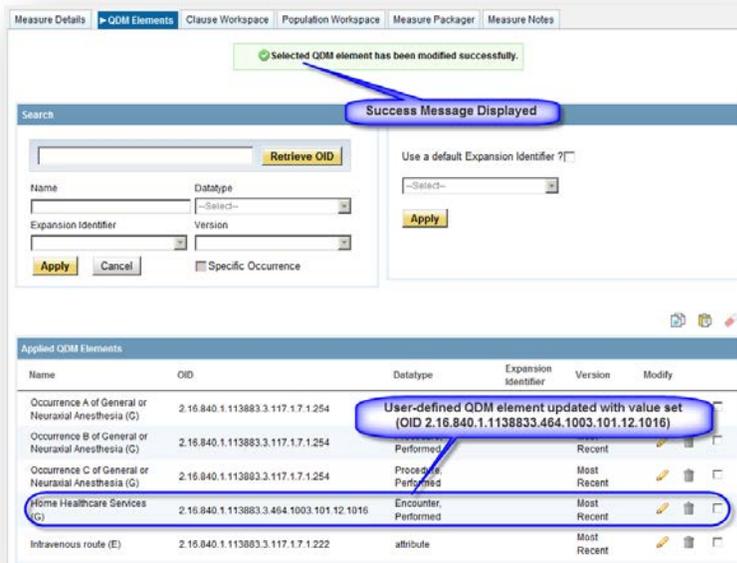


The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified. At this step, you may also change the datatype, Expansion Identifier, or Version.

Note: If a default Expansion Identifier is selected, the Expansion Identifier may not be changed. As a reminder, an Expansion Identifier or a Version may be selected for a value set, but not both.

7. Select the yellow Apply button and verify a success message displays and the new OID is represented in the Applied QDM Elements list.

Figure 106 Success Message - User-defined QDM Element Modified



D. Modify Version or Expansion Identifier

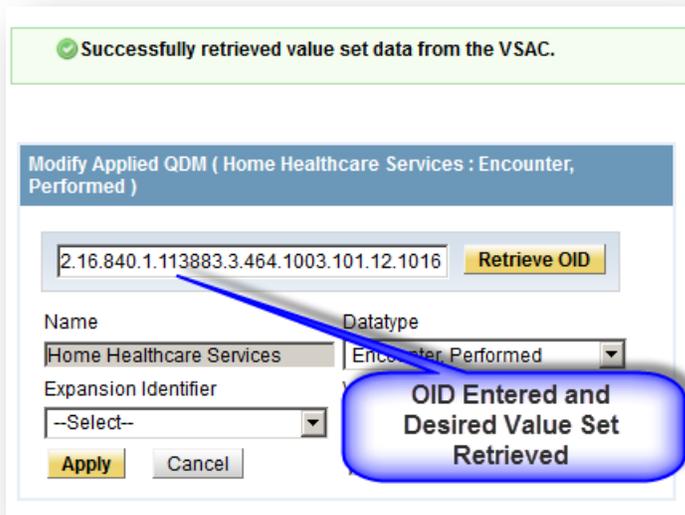
A user may need to specify a different Expansion Identifier or Version for a single QDM element or attribute which has been applied to the Applied QDM Elements list. To change the Expansion Identifier or Version for a single QDM element, a Default Expansion Identifier may not be applied to the QDM element list. Instructions for [editing or removing a Default Expansion Identifier](#) are provided later in this chapter. Complete the following steps to modify the Version or Expansion Identifier for a single QDM element or attribute applied to the Applied QDM Elements list.

1. Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
2. Verify an active connect to the VSAC API is established.
3. Select the pencil icon found in the same row of the QDM element to be modified in the Applied QDM Elements list.
4. Verify the QDM element OID populates in the QDM element creation box in the upper left hand corner of the QDM Elements page, and the following text displays in the blue banner above the OID retrieval field, "Modify Applied QDM (QDM Element Name: Category, Datatype)".

The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified.

5. Enter the OID for the desired value set.
6. Select the yellow Retrieve OID button and verify a success message displays and the new value set information is retrieved from the VSAC.

Figure 107 Success Message - Value Set Data Retrieved from VSAC

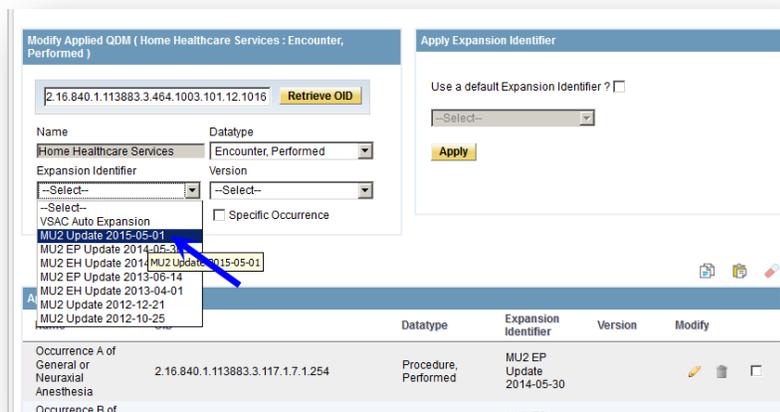


The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified. At this step, you may also change the datatype, Expansion Identifier, or Version.

Note: If a default Expansion Identifier is selected, the Expansion Identifier may not be changed. As a reminder, either an Expansion Identifier or a Version may be selected for a value set, but not both.

7. Select the desired Expansion Identifier or Version of the value set from the Expansion Identifier or Version dropdown boxes. This example shows MU2 Update 2015-05-01 being specified for the QDM Element.

Figure 108 Modify Expansion Identifier or Version - New Expansion Identifier Selected

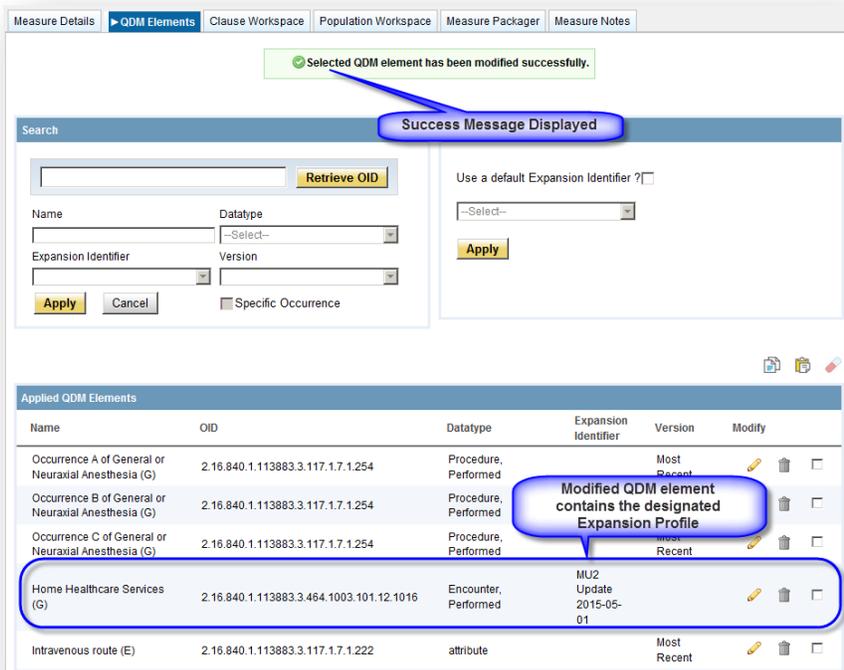


Note: If an OID is used more than once, the same Expansion Identifier or Version must be used for both. To edit an Expansion Identifier or Version where there is more than one QDM element and/or attribute using the same OID, all but one QDM element and attribute for that OID must be deleted from the QDM element list and then added back into the list after the remaining QDM element has been updated with the correct Expansion Profile or Version.

For example, Office Visit: Encounter, Performed and Office Visit: Encounter, Order are applied to the eMeasure. The Expansion Identifier MU2 Update 2015-5-01 is selected for both. The user wishes to change the Expansion Identifier to MU2 EP Update 2014-05-30. To do so, the QDM element Office Visit: Encounter, Performed should be deleted from the Applied QDM Elements list, then QDM element Office Visit: Encounter, Order can be modified to the new Expansion Identifier (i.e. MU2 EP Update 2014-05-30). The final step is to add the QDM element Office Visit, Encounter, Performed with the Expansion Identifier MU2 EP Update 2014-05-30 back into the Applied QDM Elements list.

8. Select the yellow Apply button and verify a success message displays, and the new OID is represented in the Applied QDM Elements list.

Figure 109 Success Message - QDM Element Modified



E. Modify the Specific Occurrence of a QDM Element

A QDM element can be modified by adding or removing a specific occurrence of that QDM element. This section describes the steps a user takes to add or remove a Specific Occurrence from an applied QDM element.

Note: When modifying a QDM element with a specific occurrence, the specific occurrence checkbox must be selected to retain the occurrence with the QDM element. If multiple QDM elements are being modified that differ only by the specific occurrence assigned (i.e. Occurrence A of Office Visit: Encounter, Performed, Occurrence B of Office Visit: Encounter, Performed; Occurrence C of Office Visit: Encounter Performed, etc...), Occurrence A must be modified first, then Occurrence B, then Occurrence C and so on to retain the specific occurrence assigned.

1. Select the QDM Elements page in the measure authoring tool by selecting the QDM Elements tab.
2. Verify an active connect to the VSAC API is established.
3. Select the pencil icon found in the same row of the QDM element to be modified in the Applied QDM Elements list.

Figure 110 Modify Specific Occurrence - Edit Icon

Applied QDM Elements					
Name	OID	Datatype	Expansion Identifier	Version	Modify
Occurrence A of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence C of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Home Healthcare Services (G)	2.16.840.1.113883.3.464.1003.101.12.1016	Encounter, Performed	MU2 Update 2015-05-01		  <input type="checkbox"/>
Intravenous route (E)	2.16.840.1.113883.3.117.1.7.1.222	attribute		Most Recent	  <input type="checkbox"/>
Office Visit (E)	2.16.840.1.113883.3.464.1003.101.11.1005	Encounter, Order		Most Recent	  <input type="checkbox"/>

4. Verify the QDM element OID populates in the QDM element creation box in the upper left hand corner of the QDM Elements page, and the following text displays in the blue banner above the OID retrieval field, “Modify Applied QDM (QDM Element Name: Category, Datatype)”.

Figure 111 Modify Specific Occurrence - Occurred QDM Element Selected

The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified.

5. Select the yellow Retrieve OID button and verify a success message displays and the new value set information is retrieved from the VSAC.

Figure 112 Success Message - Value Set Data Retrieved from VSAC

The Name field, Datatype, and Expansion Identifier or Version (if applicable) are automatically prefilled for the QDM element or attribute to be modified. At this step, you may also change the datatype, Expansion Identifier, or Version.

6. When the OID is retrieved the 'Specific Occurrence' checkbox is unchecked. If the modification of the QDM element desired is to remove the Specific Occurrence, then no additional action is required and the next step is to select the yellow Apply button. To retain the Specific Occurrence, the checkbox must be re-selected.

Note: To remove a Specific Occurrence from a QDM element, no other Specific Occurrences for that QDM element can be applied to the Applied QDM element list. Therefore, all other occurred QDM elements with the same OID and datatype must be deleted first to remove the Specific Occurrence from the selected QDM element.

Note: Before selecting the yellow Apply button, verify the same Expansion Identifier or Version is selected for all instances where the retrieved OID is used. Users are prevented from applying a QDM element or attribute using the same OID have a different Version or Expansion Identifier selected.

7. Select the yellow Apply button and verify a success message in a green banner displays across the top of the page, and the new OID is represented in the Applied QDM Elements list.

VII. DELETING AN APPLIED QDM ELEMENT OR ATTRIBUTE

Unused QDM elements or attributes applied to the QDM element list may be deleted. Complete the following steps to remove a QDM element or attribute from the Applied QDM Elements list.

- 1) Select the QDM Elements page.
- 2) Identify the QDM element or attribute to be deleted in the Applied QDM Elements list. In this example *Occurrence C of General or Neuraxial Anesthesia: Procedure, Performed* is being removed.
- 3) Select the trash can icon, located between the pencil icon and check box on the far right of the row for the identified QDM element or attribute.

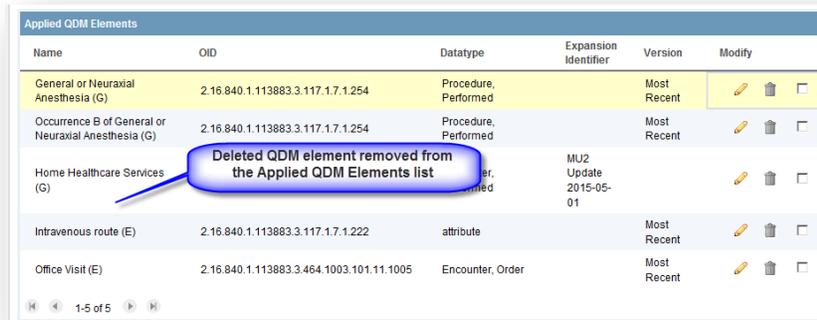
Figure 113 Deleting Applied QDM Element - Trash Icon

Applied QDM Elements					
Name	OID	Datatype	Expansion Identifier	Version	Modify
General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Occurrence C of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  <input type="checkbox"/>
Home Healthcare Services (G)	2.16.840.1.113883.3.464.1003.101.12.1016	Encounter, Performed	MU2 Update 2015-05-01		  <input type="checkbox"/>
Intravenous route (E)	2.16.840.1.113883.3.117.1.7.1.222	attribute		Most Recent	  <input type="checkbox"/>
Office Visit (E)	2.16.840.1.113883.3.464.1003.101.11.1005	Encounter, Order		Most Recent	  <input type="checkbox"/>

Note: If a QDM element or attribute is used in the measure logic or as an Item Counted, the trashcan will be disabled and the user is prevented from deleting that QDM element or attribute.

- 4) Verify the selected QDM element or attribute is removed from the QDM element list, and a success message in a green banner is present at the top of the page that says “Selected QDM element has been removed successfully.”

Figure 114 Applied QDM Elements - Selected QDM Element Deleted



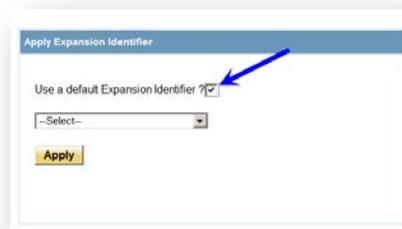
Name	OID	Datatype	Expansion Identifier	Version	Modify
General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed		Most Recent	  
Home Healthcare Services (G)				MU2 Update 2015-05-01	  
Intravenous route (E)	2.16.840.1.113883.3.117.1.7.1.222	attribute		Most Recent	  
Office Visit (E)	2.16.840.1.113883.3.464.1003.101.11.1005	Encounter, Order		Most Recent	  

VIII. APPLYING A DEFAULT EXPANSION IDENTIFIER

An Expansion Identifier may be applied to all applied QDM elements and attributes. Whether or not to apply an Expansion Identifier is at the discretion of the measure developer and measure steward. If a default Expansion Identifier is applied to the list of applied QDM elements and attributes, the selected Expansion Identifier is included in the metadata of the human readable HTML file. To apply a default Expansion Identifier performed the following steps:

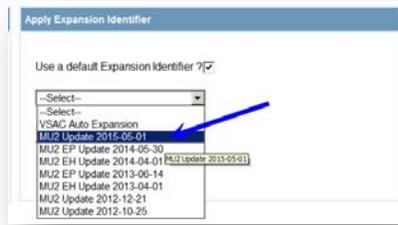
- 1) Select the QDM Elements page.
- 2) Select the checkbox titled ‘Use a default Expansion Identifier’ located on the upper right hand side of the QDM Elements page under the blue banner titled ‘Apply Expansion Identifier’.

Figure 115 Use a Default Expansion Identifier Checkbox



- 3) Select the desired Expansion Identifier from the dropdown box.

Figure 116 Default Expansion Identifier Selected from Dropdown



4) Select the yellow Apply button.

Figure 117 Apply Selected Expansion Identifier as Default



5) Verify the Applied QDM Elements list populates the selected Expansion Identifier for all QDM elements and attributes using the VSAC value set data.

Figure 118 Applied QDM Elements - Default Expansion Identifier Applied

Name	OID	Datatype	Expansion Identifier	Version	Modify
General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed	MU2 Update 2015-05-01		<input type="checkbox"/>
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed	MU2 Update 2015-05-01		<input type="checkbox"/>
Home Healthcare Services (G)	2.16.840.1.113883.3.464.1003.101.12.1016	Encounter, Performed	MU2 Update 2015-05-01		<input type="checkbox"/>
Intravenous route (E)	2.16.840.1.113883.3.117.1.7.1.222	attribute	MU2 Update 2015-05-01		<input type="checkbox"/>
Office Visit (E)	2.16.840.1.113883.3.464.1003.101.11.1005	Encounter, Order	MU2 Update 2015-05-01		<input type="checkbox"/>

Note: 'User-defined' QDM elements or attributes do not list an Expansion Identifier.

IX. REMOVING/EDITING THE DEFAULT EXPANSION IDENTIFIER

In order to change the Version or Expansion Identifier of a single QDM element or OID, a default Expansion Identifier may not be applied to the Applied QDM Element list. If a user wishes to change the default Expansion Identifier to a different Expansion Identifier or desires to remove the default Expansion Identifier from the Applied Elements list, complete the steps described next.

- 1) Select the QDM Elements page.
- 2) To remove the Expansion Identifier, select the checkbox to remove the selection in the 'Apply Expansion Identifier' box located in the upper right hand corner of the QDM Elements page.

Figure 119 Apply Expansion Identifier - Checkbox Selected

- 3) Select the yellow Apply button.
- 4) Verify the success message 'Successfully Applied VSAC Expansion Identifier to QDM Elements' displays. This message, along with the deselected 'Use a default Expansion Identifier?' checkbox, confirms your requested change is complete.
- 5) To edit the Expansion Identifier selected as the default Expansion Identifier, verify the 'Use a default Expansion Identifier' checkbox is selected.
- 6) From the dropdown box just below the checkbox, select the desired Expansion Identifier. The example below shows VSAC Auto Expansion is being selected to replace MU2 Update 2015-05-01.

Figure 120 Default Expansion Identifier - New Selection of VSAC Auto Expansion

Name	OID	Datatype	Expansion Identifier	Version	Modify
General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed	MU2 Update 2015-05-01	2015-05-01	
Occurrence B of General or Neuraxial Anesthesia (G)	2.16.840.1.113883.3.117.1.7.1.254	Procedure, Performed	MU2 Update 2015-05-01	2015-05-01	
Home Healthcare Services (G)	2.16.840.1.113883.3.464.1003.101.12.1016	Encounter, Performed	MU2 Update 2015-05-01	2015-05-01	

- 7) Select the yellow Apply button and verify the Expansion Identifier column in the Applied QDM Elements list is modified, and the success message is populated.

X. UPDATING THE LIST OF APPLIED QDM ELEMENTS AND ATTRIBUTES

The data in the VSAC for a value set can undergo a number of changes. A feature is added to the QDM Elements page to ensure that the VSAC data to be included in the measure package includes the MOST RECENT updates to a value set draft, Version, or Expansion Identifier applied to the eMeasure.

The most recent VSAC value set data for an applied QDM element or attribute is automatically included at the time the measure package is created; however, there are times when a MAT user would like to view those changes prior to creating a measure package.

To update the Applied QDM Elements list and its contents with the most recent VSAC information perform the following steps.

- 1) Select the QDM Elements page.
- 2) Verify an active connect to the VSAC API is established.
- 3) Select the yellow Update From VSAC button located at the bottom left hand corner of the QDM Elements page.
- 4) A success message displays at the bottom of the applied QDM element list confirmed the update from the VSAC.

The following are potential reasons for an update from the VSAC not to occur:

- QDM element is constructed without a VSAC value set.
- The value set used to construct the QDM element no longer exists in the VSAC.
- You are not assigned to the authoring group for a particular value set within the VSAC.

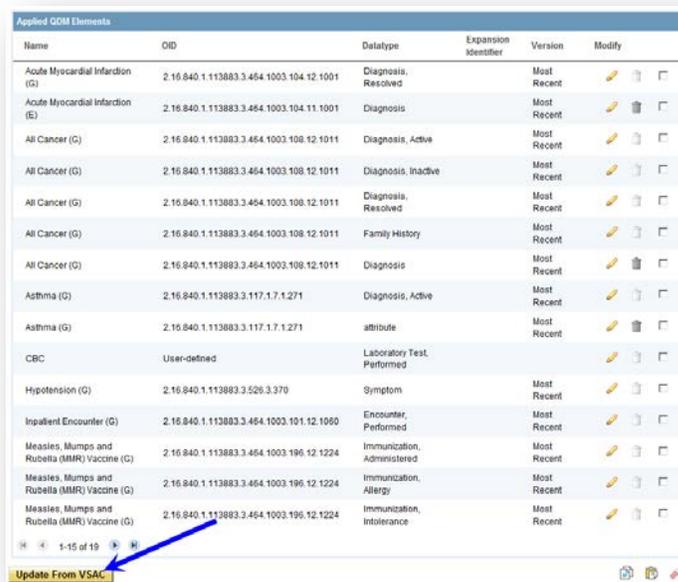
Note: When the yellow Update From VSAC button is selected, a validation of the OIDs and datatypes used for the applied QDM elements and attributes is performed. See the next section for more detailed information.

XI. VALIDATING THE OID AND DATATYPES USED IN THE APPLIED ELEMENTS LIST

To validate the OIDs and datatypes used in the applied QDM elements and attributes in the Applied QDM Elements list complete the following steps:

- 1) Select the QDM Elements page.
- 2) Verify an active connect to the VSAC API is established.
- 3) Select the yellow Update From VSAC button located at the bottom left hand corner of the QDM Elements page.

Figure 121 Applied QDM Elements - Update From VSAC Button



Name	OID	Datatype	Expansion Identifier	Version	Modify
Acute Myocardial Infarction (G)	2.16.840.1.113883.3.464.1003.104.12.1001	Diagnosis, Resolved		Most Recent	
Acute Myocardial Infarction (E)	2.16.840.1.113883.3.464.1003.104.11.1001	Diagnosis		Most Recent	
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Active		Most Recent	
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Inactive		Most Recent	
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Resolved		Most Recent	
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Family History		Most Recent	
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis		Most Recent	
Asthma (G)	2.16.840.1.113883.3.117.1.7.1.271	Diagnosis, Active		Most Recent	
Asthma (G)	2.16.840.1.113883.3.117.1.7.1.271	attribute		Most Recent	
CBC	User-defined	Laboratory Test, Performed			
Hypotension (G)	2.16.840.1.113883.3.526.3.370	Symptom		Most Recent	
Inpatient Encounter (G)	2.16.840.1.113883.3.464.1003.101.12.1060	Encounter, Performed		Most Recent	
Measles, Mumps and Rubella (MMR) Vaccine (G)	2.16.840.1.113883.3.464.1003.196.12.1224	Immunization, Administered		Most Recent	
Measles, Mumps and Rubella (MMR) Vaccine (G)	2.16.840.1.113883.3.464.1003.196.12.1224	Immunization, Allergy		Most Recent	
Measles, Mumps and Rubella (MMR) Vaccine (G)	2.16.840.1.113883.3.464.1003.196.12.1224	Immunization, Intolerance		Most Recent	

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Update From VSAC

- 4) After the 'Update from VSAC' is completed, all QDM elements with invalid datatypes display a caution icon (yellow triangle) next to the datatype with the datatype text in red. If the QDM element contains an invalid OID or is a User-defined QDM element, the caution icon (yellow triangle) displays to the left of the OID or the text 'User-defined'.

Figure 122 QDM Elements List Validation - Invalid Datatypes

Name	OID	Datatype	Expansion Identifier	Version	Modify
Acute Myocardial Infarction (G)	2.16.840.1.113883.3.464.1003.104.12.1001	Diagnosis, Resolved		Most Recent	<input type="checkbox"/>
Acute Myocardial Infarction (E)	2.16.840.1.113883.3.464.1003.104.11.1001	Diagnosis		Most Recent	<input type="checkbox"/>
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Active		Most Recent	<input type="checkbox"/>
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Inactive		Most Recent	<input type="checkbox"/>
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis, Resolved		Most Recent	<input type="checkbox"/>
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Family History		Most Recent	<input type="checkbox"/>
All Cancer (G)	2.16.840.1.113883.3.464.1003.108.12.1011	Diagnosis		Most Recent	<input type="checkbox"/>
Asthma (G)	2.16.840.1.113883.3.117.1.7.1.271	Diagnosis, Active		Most Recent	<input type="checkbox"/>
Asthma (G)	2.16.840.1.113883.3.117.1.7.1.271	attribute		Most Recent	<input type="checkbox"/>
CBC	User-defined	Laboratory Test, Performed			<input type="checkbox"/>

XII. COPY AND PASTE QDM ELEMENTS AND ATTRIBUTES FROM ONE MEASURE TO ANOTHER

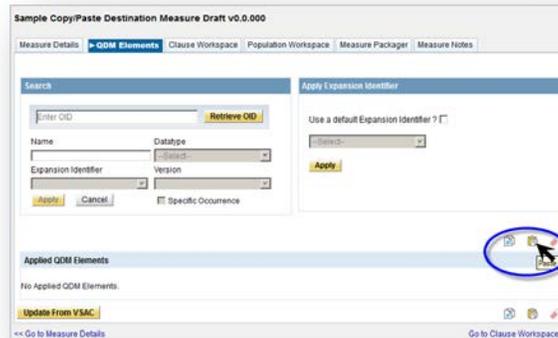
MAT users may copy QDM elements and/or attributes added to a measure to another measure within the tool. QDM elements and attributes may be copied from measures that are 'Read-only', shared, or owned by the signed-in user. The copied QDM elements or attributes may be pasted into measures owned or shared by the signed-in user.

- 1) Access the measure from which QDM elements and/or attributes are to be copied.
- 2) Navigate to the QDM Elements page by selecting the QDM Elements tab in the Measure Composer.
- 3) Select the QDM elements and attributes to be copied from the Applied QDM Elements list by selecting the checkbox in the last column in the row for the desired QDM element or attribute.
- 4) After all QDM elements and attributes to be copied are selected, select the copy icon located at the top or bottom right hand corner of the Applied QDM Elements list. (By hovering over the copy icon, a tool tip confirms the 'copy' icon is being selected.)

Note: Use the clear icon (eraser) to deselect all checkboxes, if applicable.

- 5) Select the Measure Library tab and select the desired destination measure.
- 6) Select the QDM Elements tab for the destination measure.
- 7) Select the paste icon located in the top or bottom right hand corner of the Applied QDM Elements list to the right of the copy icon. (By hovering over the paste icon, the tool tip confirms the paste icon is being selected.)

Figure 123 QDM Elements Page - Paste Icon



- 8) After selecting the paste icon, confirm the copied QDM elements are pasted into the destination measure.

Note: QDM elements and/or attributes using the same OID must have the same Version or Expansion Identifier. The copied QDM element or attribute will not paste successfully if there is a QDM element or attribute in the destination measure using the same OID, but a different Version or Expansion Identifier.

The following success message is displayed after the selected QDM elements and attributes are successfully copied.

Guidance for resolving validation errors in the Applied Element list can be found in [Appendix E](#).

After creating and applying QDM Elements to a measure, users will continue to the Clause Workspace to build the measure logic. Instructions on how to build measure logic are provided in the next chapter, Chapter 9: Measure Composer—Clause Workspace.

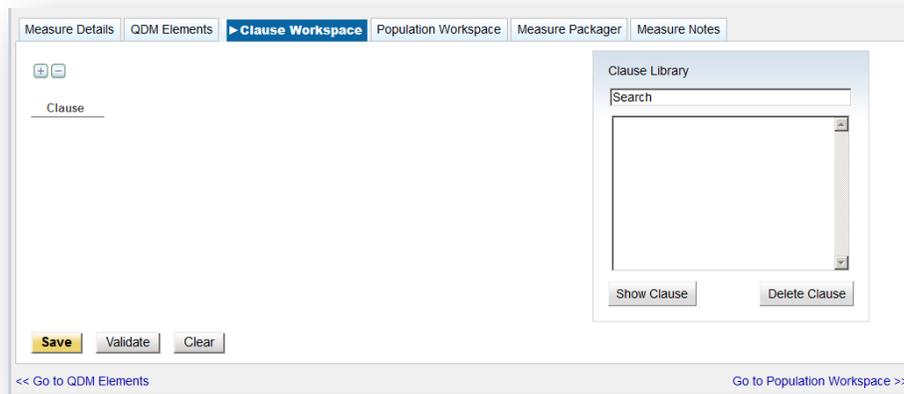
Chapter 9: Measure Composer

– Clause Workspace

Chapter Overview: The Clause Workspace chapter provides the steps for naming, constructing, and modifying measure clauses. Measure clauses constructed in the Clause Workspace are stored in a Clause Library. These clauses are then applied in the Population Workspace to define specific populations within the selected measure.

The Clause Workspace is the third tab within the Measure Composer and has a workspace on the left side to build measure logic and a Measure Library to store constructed clauses on the right side.

Figure 124 Clause Workspace



Only one clause may be constructed at a time. Changes made within the Clause Workspace may be retained by selecting the Save button (yellow) at the bottom of the page. MAT users are prompted to save changes to the Clause Workspace when attempting to navigate from the Clause Workspace prior to saving changes. A warning message appears across the top of the Clause Workspace when changes are not saved.

Short cut options which may be used in the Clause Workspace are listed below:

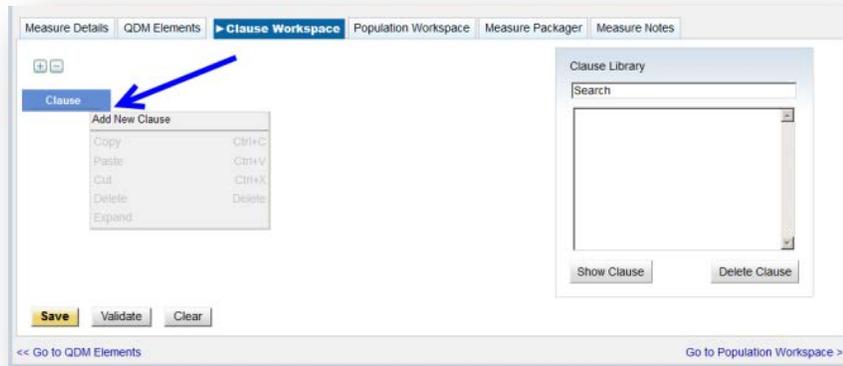
- Ctrl + C to Copy
- Ctrl + V to Paste
- Ctrl + X to Cut

I. NAMING A CLAUSE

The first step in building a clause within the Clause Workspace is to name the clause.

- 1) Right-click on the word 'Clause' in the upper, left corner of the Clause Workspace and select Add New Clause.

Figure 125 Clause Workspace - Add New Clause

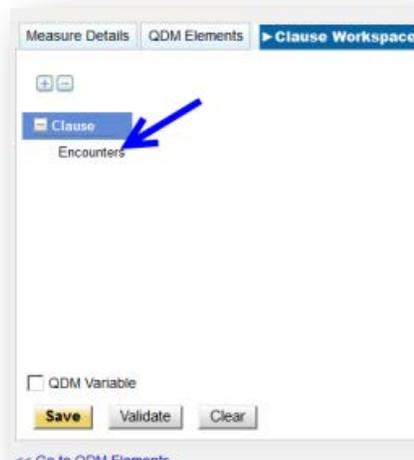


- 2) Add a descriptive clause name to the text field 'New Clause Name'. Choose a meaningful clause name for the clause to be constructed. For example, if the constructed clause is intended to identify specific encounters, the measure developer may choose to name the clause 'Encounters'.

Note: The clause name must begin with a letter, cannot exceed 75 characters, and may include alphanumeric, white space, and/or underscore.

- 3) After adding a descriptive name to the text field in the pop-up, select the OK button (gray).
- 4) The newly named clause appears below the word 'Clause' in the Clause Workspace.

Figure 126 Clause Workspace - New Clause



II. BUILDING CLAUSE LOGIC

After a clause is named, the measure author begins defining the logic. First let's review the tools available to the measure author when building a measure clause.

A. Available Tools

When the measure developer performs a right-click on the clause name (e.g., Encounters), a menu displays with the following options: Add, Copy, Paste, Cut, Delete, Expand, Edit, and View Human Readable. By hovering over 'Add' an expanded menu is displayed with the following options: Union, Intersection, QDM element, Timing, Functions, and Relationship.

1. Add Menu

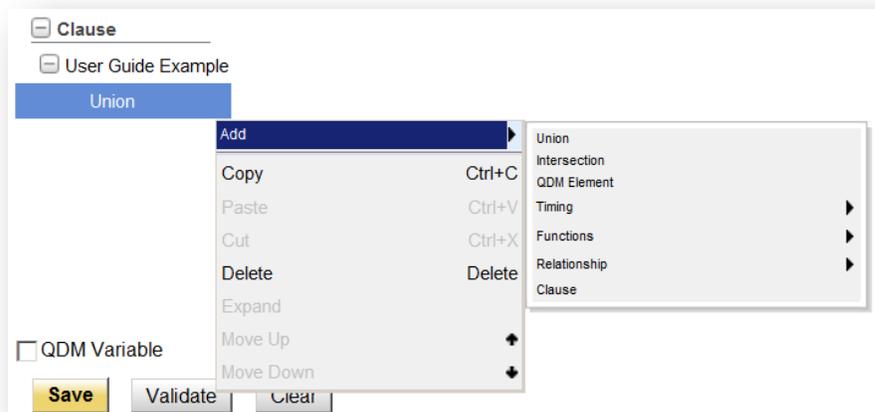
The steps for building four common measure clauses are reviewed in the [Build a Measure Clause](#) section of this chapter. The following are options within the expanded 'Add' menu of the Clause Workspace.

a) Union

Union is a subset operator which can be used when constructing a measure clause. To review use cases for the set operators Union and Intersection, review the [Quality Data Model](#).

Once Union is added to the measure logic, at least one child node must be added to the subset operator Union. The options to add Union, Intersection, QDM Element, Timing, Functions, Relationships, and an existing Clause are enabled, as pictured below.

Figure 127 Union – Right Click Menu Options



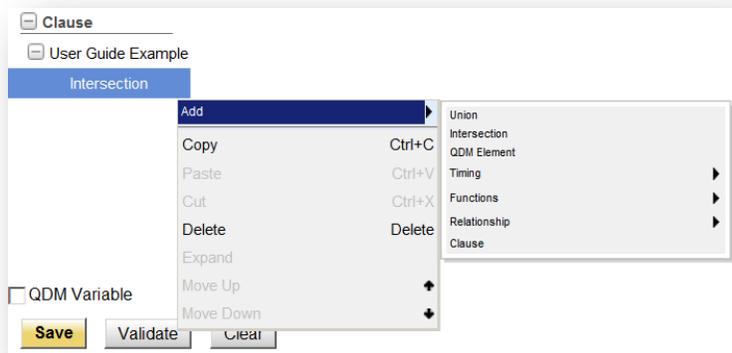
Note: The Clause Workspace validation fails when Union is added and is without a child node. The message reads, "Measure logic is incomplete. Union, Intersection, and Functions must contain at least one child node."

b) Intersection

Intersection is a subset operator which can be used when constructing a measure clause. To review use cases for the set operators Union and Intersection, review the [Quality Data Model](#).

Like the subset operator Union, once Intersection is added to the measure logic, at least one child node must be added to the subset operator Intersection. Once Intersection is added to the measure logic, the options to add Union, Intersection, QDM Element, Timing, Functions, Relationships, and an existing Clause are enabled, as pictured below.

Figure 128 Intersection – Right Click Menu Options

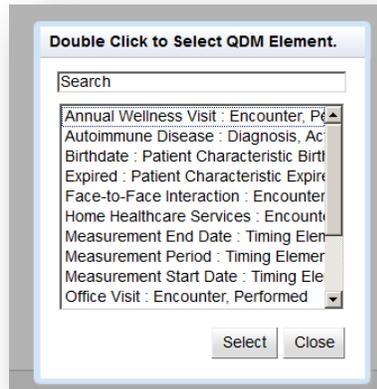


Note: Intersection must contain at least one child node. The Clause Workspace validation fails when Intersection is added and is without a child node. The message reads, "Measure logic is incomplete. Union, Intersection, and Functions must contain at least one child node."

c) QDM Element

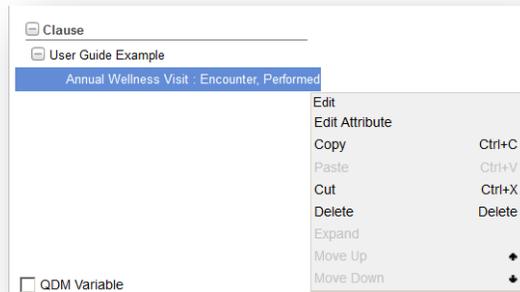
QDM elements are applied to the measure in the QDM Elements page of the Measure Composer. When QDM Element is selected from the 'Add' menu a separate pop-up window displays with all the QDM elements applied to the selected measure. Add a QDM element to the selected measure by scrolling through the QDM element list box, selecting the desired QDM element and clicking the gray Select button. Double-clicking the element name also adds the QDM Element to the clause.

Figure 129 Clause Workspace - Applied QDM Element and Attribute List



Once the QDM Element is added to the measure logic, by right-clicking on the QDM Element name in the clause logic, the Edit, Edit Attribute, Copy, Cut, and Delete options are enabled.

Figure 130 QDM Element - Right Click Menu Options



Navigation Tip: To add QDM elements to a measure for use in the Clause Workspace, navigate to the QDM Elements tab of the Measure Composer.

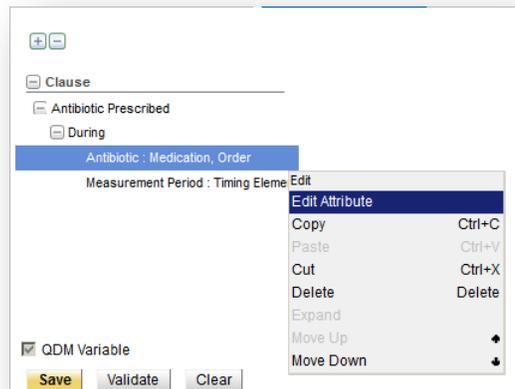
Review [Chapter 8 Measure Composer-QDM Elements](#) for instructions on how to add QDM elements to a measure.

d) Edit Attribute for Added QDM Element

Once a QDM element is added to a clause with the Clause Workspace, users may choose to further define this element by applying an attribute. To do so, users will use the 'Edit Attribute' option in the right-click menu for the selected QDM element. Directions for applying and editing an attribute are provided below.

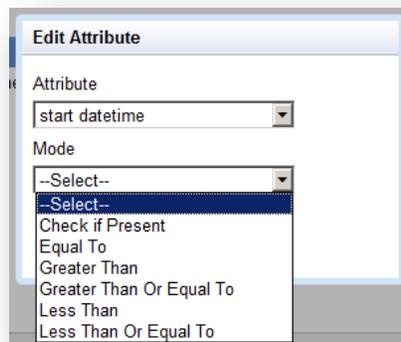
- i. Right-click on the QDM element name to add or edit an attribute.
- ii. Select 'Edit Attribute' from the right-click menu.

Figure 131 Edit Attribute Selected



- iii. A pop up window populates. Select the desired attribute and mode for the selected QDM element.

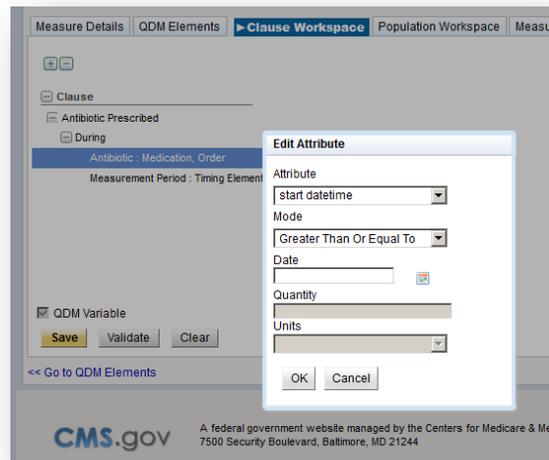
Figure 132 Edit Attribute - Attribute and Mode



- iv. Enter the Date, Quantity, and/or Units to further define the selected attribute. Available options for the attribute and mode selected will be enabled.

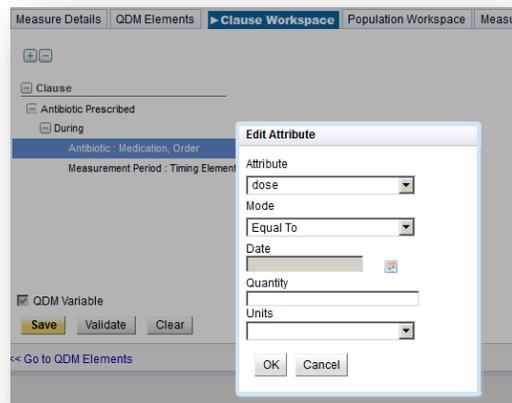
In the example below, the 'Date' field is enabled since 'start Datetime' and 'Greater Than or Equal To' are selected. 'Quantity' and 'Units' are not available options for this attribute type and mode; therefore, these input fields are disabled.

Figure 133 Edit Attribute - Quantity and Units Disabled



In the next example, the attribute type 'dose' is selected and the mode selected is 'Equal To'; therefore the 'Date' input field is disabled and 'Quantity' and 'Units' is enabled.

Figure 134 Edit Attributes - Date Disabled

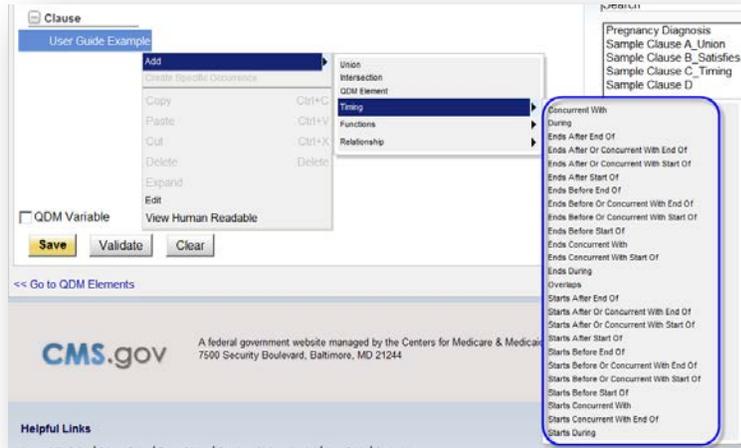


e) Timing

A Timing may be added to the measure clause by selecting the Timing option in the expanded 'Add' menu. The available Timings within the MAT reflect the QDM 4.0 and 4.1 updates. To review use cases for the available timing options, review the Quality Data Model.

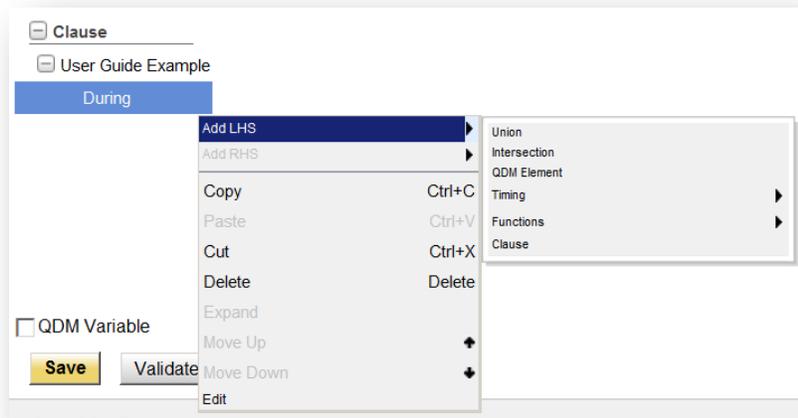
Timing options available within the MAT are listed in the screen print below.

Figure 135 Clause Workspace - Timings



Immediately after adding a Timing to the measure logic, the following options, pictured below, are available in the right-click menu for a Timing: ability to add left hand side logic (LHS), Copy, Paste, Cut, Delete, and Edit. After adding a LHS on a Timing, the option to add a right hand side (RHS) for a Timing becomes available. Expanded menu options for the LHS and RHS are Union, Intersection, QDM Element, Timing, Functions, and Clause.

Figure 136 Timing - Right Click Menu Options



f) Functions

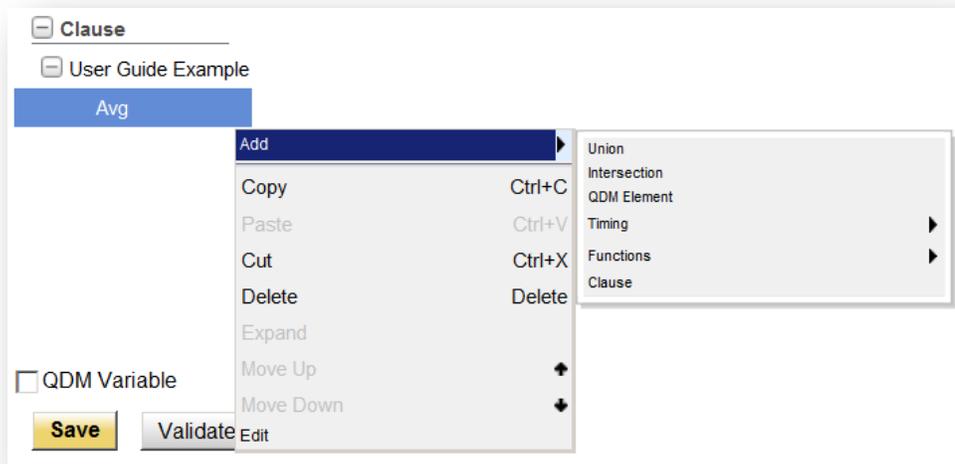
Functions may be added to a measure clause. To display the available 'Function' options, hover the mouse over the 'Add' option in the right-click menu and select 'Functions' in the expanded menu. Available functions within the MAT are:

- Age At

- Avg
- Count
- Datetimediff
- Fifth
- First
- Fourth
- Max
- Median
- Min
- Most Recent
- Satisfies All
- Satisfies Any
- Second
- Sum
- Third

Again, view the Quality Data Model for descriptions and use cases for the available functions. Once a function is added to the measure logic, the following right-click options, pictured below, are available for the added Function: Add Union, Intersection, QDM Element, Timing, Functions, or a previously constructed Clause, or Copy, Cut, Delete, and Edit the displayed Function.

Figure 137 Functions - Right Click Menu Options

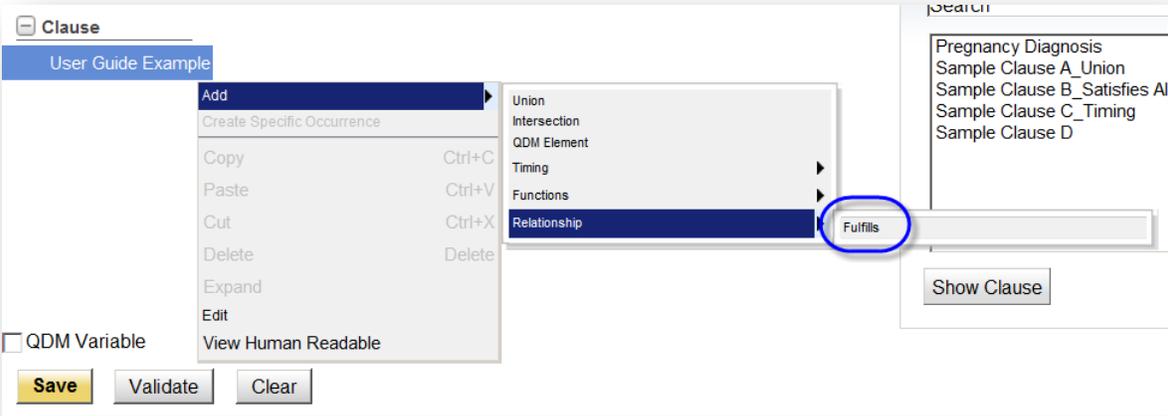


Note: Functions (i.e. Age At, Count, and Most Recent) must contain at least one child node. The Clause Workspace validation fails when a function is added and is without a child node. The message reads, "Measure logic is incomplete. Union, Intersection, and Functions must contain at least one child node."

g) Relationship

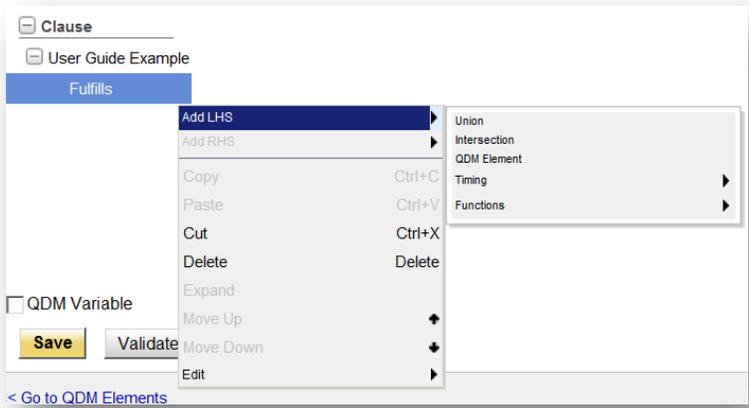
A Relationship may be added to the measure clause by selecting the 'Relationship' option in the expanded 'Add' menu. The available Relationship options within the MAT reflect the most current Quality Data Model. View the QDM for additional information and use cases for using a Relationship when building measure logic. Fulfills is currently the only relationship option available within the MAT as pictured below.

Figure 138 Clause Workspace - Relationship



Once a Relationship is added to the measure logic, the right-click menu options for the Relationship, pictured below are: Add LHS or RHS Union, Intersection, QDM Element, Timing, or Functions, and Cut or Delete.

Figure 139 Relationship - Right Click Menu Options

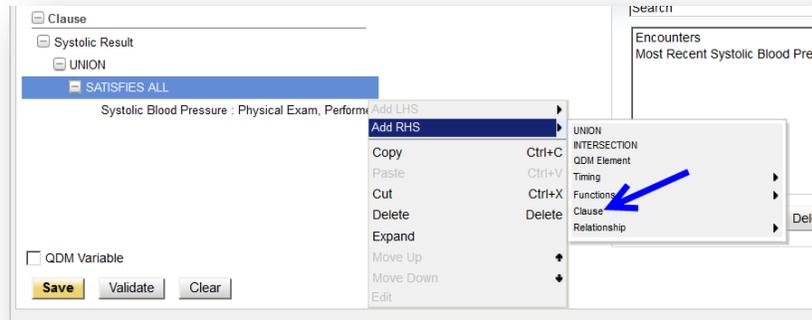


h) Add Previously Constructed Clause

Previously constructed clauses may be added to a clause within Clause Workspace. There are times when the measure developer would like to use a previously constructed

clause as part of a new clause within Clause Workspace. This option will be present in the expanded right-click menu when it is an available option.

Figure 140 Clause Workspace - Add Clause



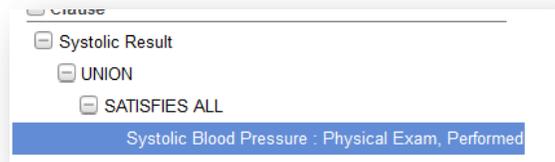
When a clause is added, Delete and Edit options are enabled in the right-click menu.

i) Copy and Paste

The ability to copy a segment of the clause is enabled when it is an available option. To copy a segment of logic, complete the following steps.

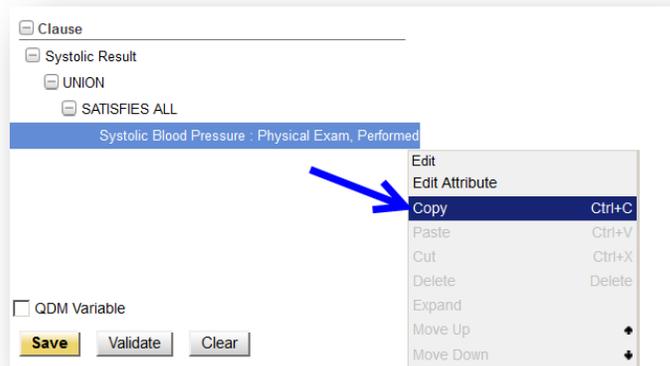
- i. Select the segment of logic to be copied and it will be highlighted in blue.

Figure 141 Copy - QDM Element



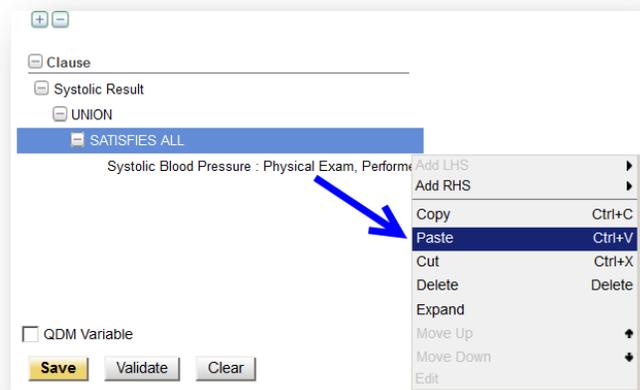
- ii. Right-click and select the 'Copy' option in the displayed menu.

Figure 142 Right Click Menu - Copy Selected



- iii. Next, select the location within the measure logic where the copied portion is to be added, right-click, and select 'Paste'.

Figure 143 Right Click Menu - Paste Selected

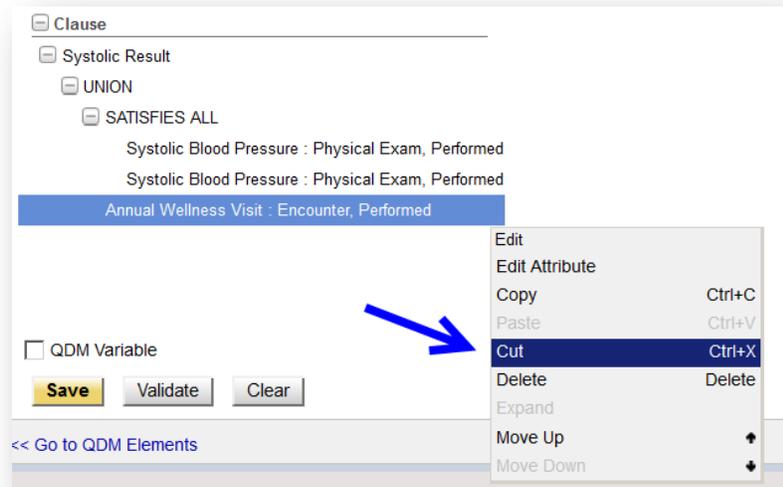


- iv. Verify the copied segment is located where desired within clause logic and select the Save button (yellow) to retain changes.
- j) Cut and Paste

The ability to cut and paste a segment of the clause is enabled when it is an available option. To cut a segment of logic, complete the following steps.

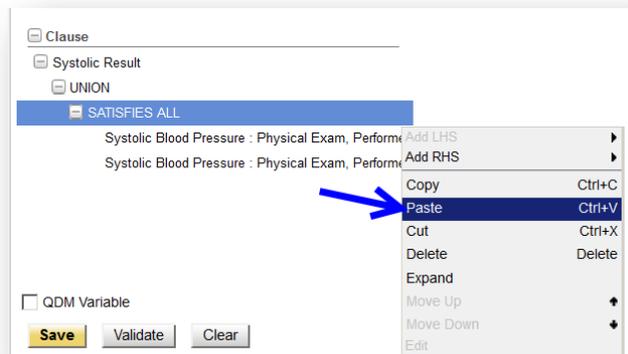
- i. Select the segment of logic to be moved and it will be highlighted in blue.
- ii. Right-click and select the 'Cut' option in the displayed menu.

Figure 144 Right Click Menu – Cut Selected



- iii. Next, select the location within the measure logic where the cut portion is to be added, right-click, and select 'Paste'.

Figure 145 Right Click Menu - Paste Selected



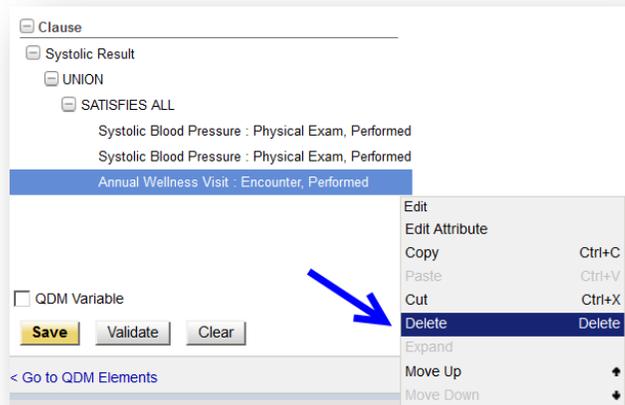
- iv. Verify the cut segment is located where desired within clause logic and select the Save button (yellow) to retain changes.

k) Delete

The ability to delete a segment of the clause is enabled when it is an available option. To delete a segment of logic, complete the following steps.

- i. Select the segment of logic to be deleted and it will be highlighted in blue.
- ii. Right-click and select the 'Delete' option in the displayed menu.

Figure 146 Right Click Menu - Delete Selected



iii. Verify the segment of logic highlighted has been removed from the clause and select the Save button (yellow) on the bottom, left corner of the page to retain changes.

l) Expand or Collapse Segments of Logic

The ability to expand a segment of the clause is available. To the left of segments of clause logic within Clause Workspace is the Expand/Collapse tool. By selecting the Expand tool, which is a 'plus' sign, as pictured below, the logic expands.

Figure 147 Collapse and Expand Tools



By selecting the Collapse tool, which is a 'minus' sign, as pictured below, the logic collapses.

The segments of clauses may also be expanded by selecting 'Expand' in the right-click menu. This option will be disabled if there is no logic to expand.

2. Edit

The ability to edit a segment of the clause is available. The 'Edit' option will be enabled when it is an available option. Additional instructions for editing segments of measure logic are provided in the [Edit a Clause](#) portion of this chapter.

3. View Human Readable

To view the human readable for the displayed clause complete the following steps:

- a) Right-click on the clause name located just below the word 'Clause' in the workspace on the left of the page.
- b) Select the 'View Human Readable' option at the bottom of the menu. The human readable for the displayed clause is displayed in a separate window as pictured below:

Figure 148 Human Readable for Selected Clause



Note: If using Firefox as the internet browser, users may need to allow pop-ups to view the human readable.

- c) After viewing the human readable for the displayed clause, select the 'X' in the upper, right corner of the window to close the window and return to the Clause Workspace.

B. Building a Measure Clause

This section is dedicated to showing how to build four common clauses within the Clause Workspace. These are only sample clauses that will be applied to a sample measure.

1. Timing Clause

This example shows users how to construct a clause with using a timing element and a QDM element to complete the left hand side (LHS) of clause and a QDM element to complete the right hand side of the clause (RHS).

The timing clause being constructed is Pregnancy: Diagnosis Starts During Measurement Period: Timing Element.

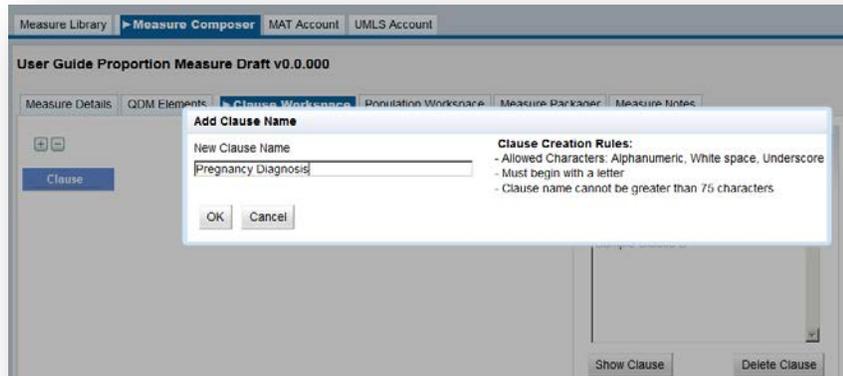
This clause breaks down into three segments; timing (Starts During), LHS (Pregnancy: Diagnosis), and RHS (Measurement Period: Timing Element).

This clause is built in the Clause Workspace by completing the following steps:

- a) Right-click on the word 'Clause' at the top of the Clause Workspace.
- b) Select the option 'Add New Clause'.

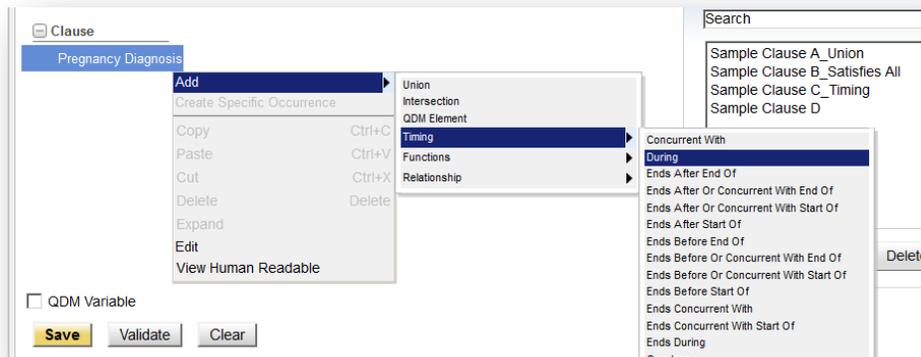
- c) Provide a descriptive name in the 'Add New Clause' pop-up window. This clause will be named Pregnancy Diagnosis; therefore, type Pregnancy Diagnosis in the text field and select the OK button (gray).

Figure 149 Name New Clause



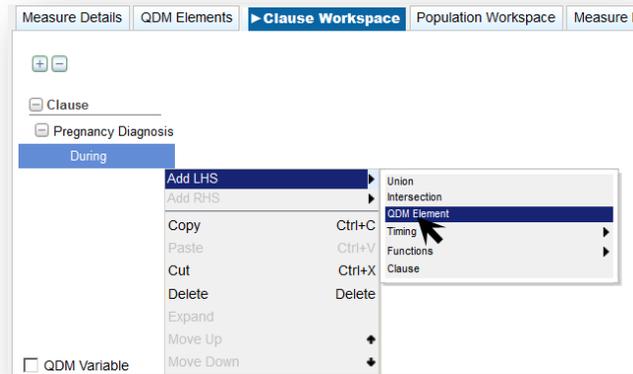
- d) Next, right-click on the clause name, in this instance Pregnancy Diagnosis and hover over the 'Add' option in the menu.
- e) Select the timing 'During' by hovering over the Timing option in the expanded menu and selecting the timing, 'During'. The timing, 'During', displays just below the clause name.

Figure 150 Timing Selected - During



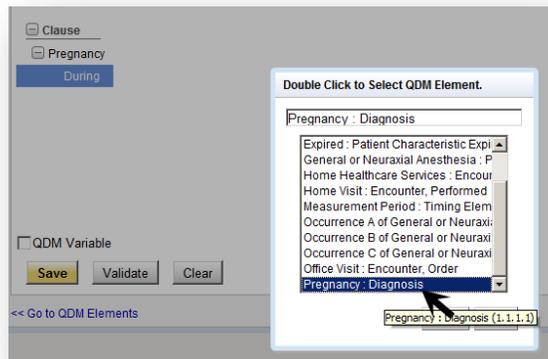
- f) Right-click on the timing 'During'. Notice LHS is the first enabled option in the displayed menu.
- g) Select LHS and an expanded menu is displayed giving the option to add a UNION, INTERSECTION, QDM Element, Timing, Function, Relationship, or Clause. Select the QDM Element.

Figure 151 QDM Element Selected from Right Click Menu for Timing During



- h) After selecting the QDM Element in the right-click menu, a pop-up box listing all applied QDM elements is displayed. Select the desired QDM element. In this example, the desired QDM element to complete the LHS of the clause is Pregnancy: Diagnosis. Pregnancy: Diagnosis is now listed directly below the timing 'During' in the workspace.

Figure 152 QDM Element Selected - Pregnancy: Diagnosis

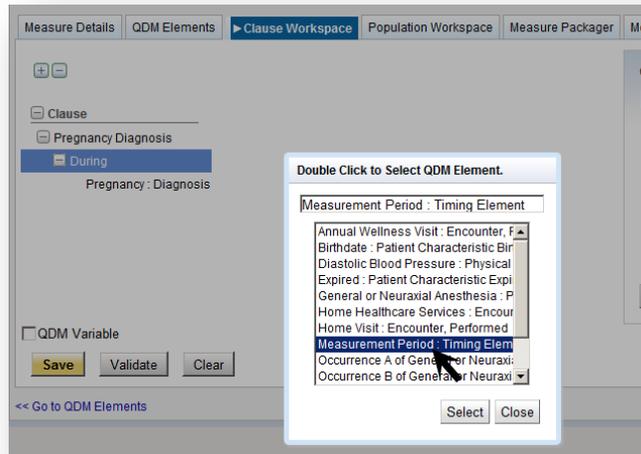


Navigation Tip: To add QDM elements to a measure for use in the Clause Workspace, navigate to the QDM Elements tab of the Measure Composer. Review [Chapter 8 Measure Composer-QDM Elements](#) for instructions on how to add QDM elements to a measure.

- i) Next right-click on the timing 'During'. Now the LHS menu option is disabled and the RHS menu option is enabled.
- j) Select RHS and select QDM Element in the expand menu.

- k) Select the QDM Element Measurement Period: Timing Element from the pop-up menu. Measurement Period: Timing Element appears below the QDM Element Pregnancy Diagnosis.

Figure 153 QDM Element Selected - Measurement Period: Timing Element



- l) The clause Pregnancy Diagnosis is complete. Select the Save button (yellow) to retain changes. (A message displays confirming the clause is successfully saved.)

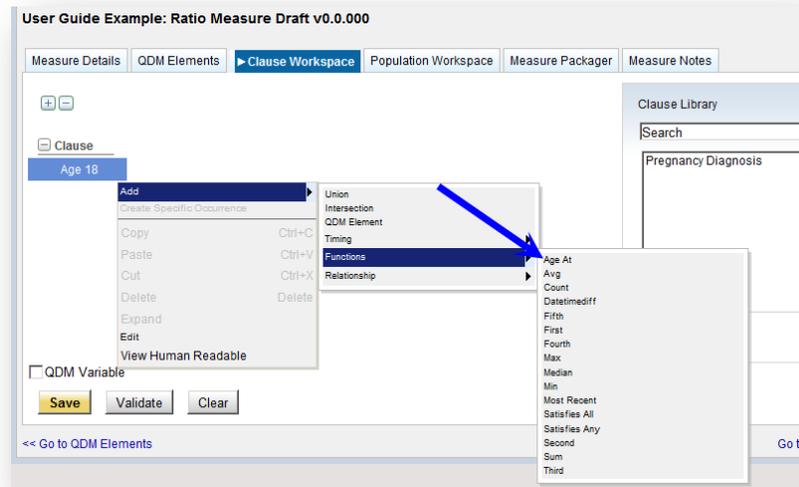
2. Function Clause-AGE AT

This section will describe how to create a clause using the function AGE AT. Frequently a measure needs to specify a minimum age at the onset of the measurement period. If a measure was trying to capture patients who are greater than or equal to 18 years of age at the onset of the measurement period, the following clause may be added to the measure: Age >= 18 years at Measurement Period: Timing Element.

To build this clause, complete the following steps.

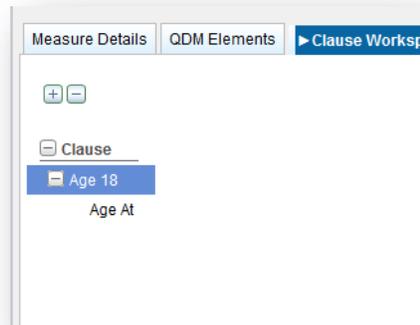
- Right-click on the word 'Clause' at the top of the Clause Workspace.
- Select the option 'Add New Clause'
- Provide a descriptive name in the 'Add New Clause' pop-up window. This clause will be named AGE 18; therefore, type AGE 18 in the text field and select the OK button (gray).
- Right-click on the clause name AGE 18, hover over 'Add' and then hover over the function option in the expanded menu.
- Select the function 'AGE AT' in the function list.

Figure 154 Add Function - Age At



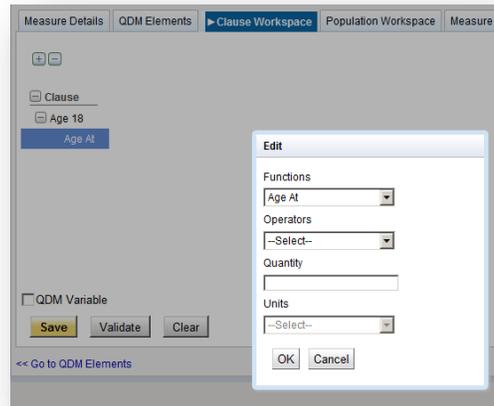
- f) The function 'Age At' is listed just below the clause name AGE 18 in the workspace. Right-click the function 'Age At'.

Figure 155 Function Added - Age At



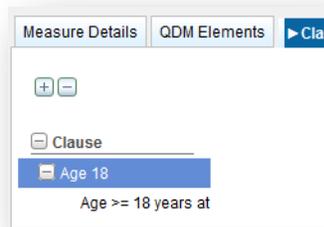
- g) Right-click on 'Age At', select the 'Edit' option at the bottom of the menu. A pop-up window is generated to allow the user to add operators, quantity, and units to further define the function 'Age At'.

Figure 156 Edit Function Pop-up Menu - Age At



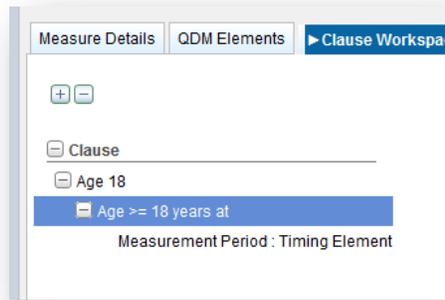
- h) To continue building the desired logic, select the dropdown box for 'Operators' and select 'greater than or equal to'.
- i) Next, enter the desired 'Quantity', 18, in the text field provided.
- j) Select the dropdown for 'Units', select the desired unit, years, and select the OK button (gray) to apply. AGE AT now appears as pictured below:

Figure 157 Attribute Added for Function Age At



- k) Right-click on 'Age >=18 years at', hover over 'Add', and select QDM Element. From the QDM Element list, select Measurement Period: Timing Element.

Figure 158 QDM Element Added - Measurement Period: Timing Element

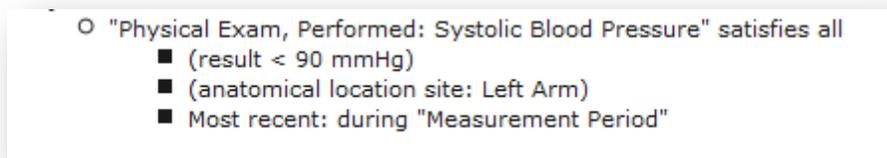


- l) Select the Save button (yellow) to retain changes. The clause AGE 18 now appears in the Clause Library
3. Function Clause –SATISFIES ALL

This section describes how to create a clause using the function Satisfies All. The function Satisfies All has one left hand side (LHS) QDM element, and two or more right hand side (RHS) logic segments which are all satisfied for the selected LHS QDM element. For additional information about using the function Satisfies, please review the [Quality Data Model](#).

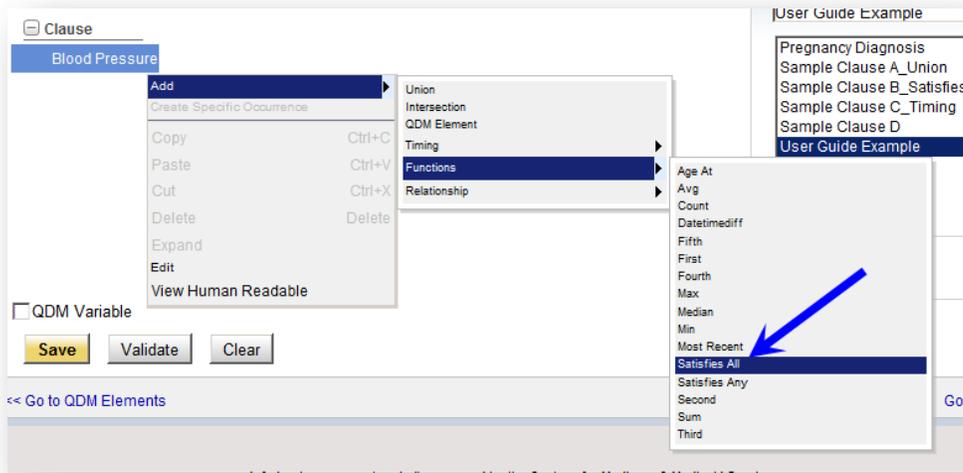
This example will construct the following measure logic using the Clause Workspace:

Figure 159 Human Readable - Clause Using the Function Satisfies All



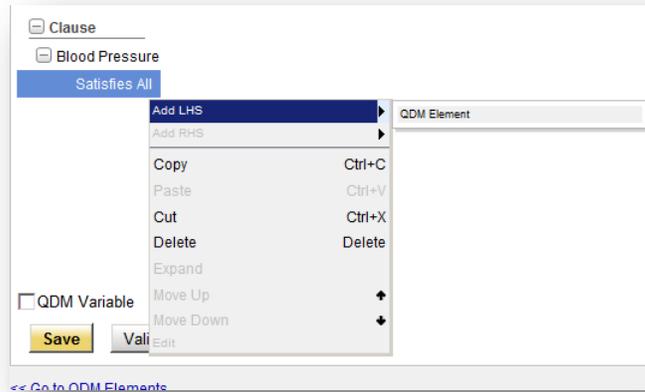
- a) Right-click on the word 'Clause' at the top of the Clause Workspace and select the option 'Add New Clause'.
- b) Provide a descriptive name in the 'Add New Clause' pop-up window. This clause will be named Blood Pressure; therefore, type Blood Pressure in the text field and select the gray OK button.
- c) Right-click on clause name Blood Pressure, hover over 'Add', and hover over Functions. Select the Function Satisfies All.

Figure 160 Select Function - Satisfies All



- d) Right-click on the function Satisfies All added just below the clause name and hover over the 'Add' option. Notice, only the option to add a QDM element is displayed.

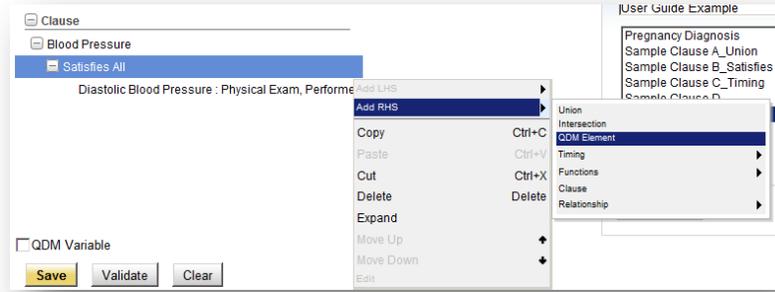
Figure 161 Add QDM Element to LHS



Note: QDM Element is the only LHS option when using the functions Satisfies All or Satisfies Any, and an attribute may not be applied to the QDM element used for the LHS of the clause logic.

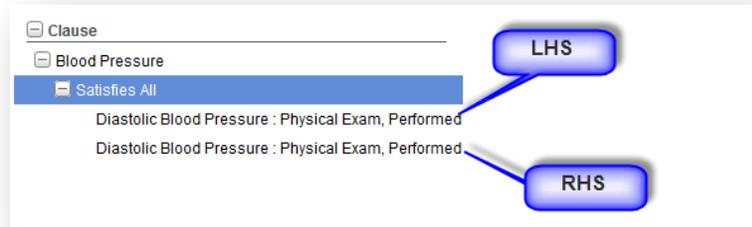
- e) Select the QDM Element in the expanded menu and add the QDM Element *Diastolic Blood Pressure: Physical Exam, Performed* from the QDM element list by selecting the QDM element name.
- f) Right-click on the function satisfies All, and hover over the 'Add RHS' Option. Select the QDM Element in the expanded menu.

Figure 162 Add QDM Element to RHS



- g) Select the QDM element *Diastolic: Physical Exam, Performed* in the QDM element list.

Figure 163 Clause Workspace - QDM Element Applied to LHS and RHS

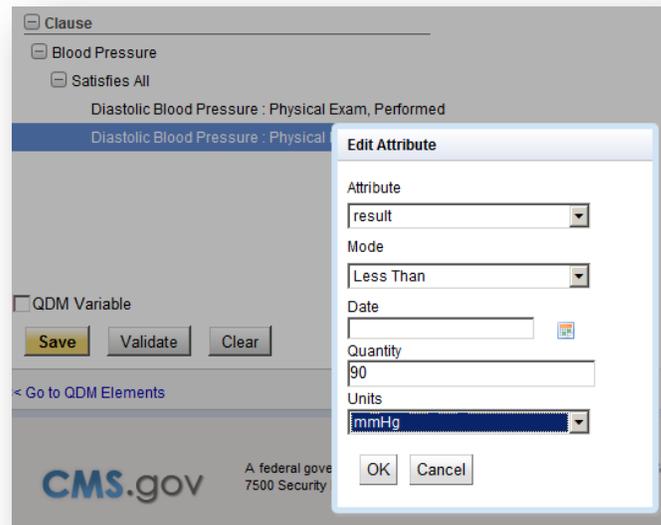


- h) Right-click on the QDM element name *Systolic Blood Pressure: Physical Exam Performed* located in the last position of the displayed logic.

Note: The same QDM element is repeated for the LHS and RHS of the logic. In other words, the LHS QDM element is repeated in all child nodes of the logic statement. In this scenario, the QDM element *Systolic Blood Pressure: Physical Exam Performed* is selected for the LHS of the logic statement, then *Systolic Blood Pressure: Physical Exam Performed* is selected again for the first RHS of the statement.

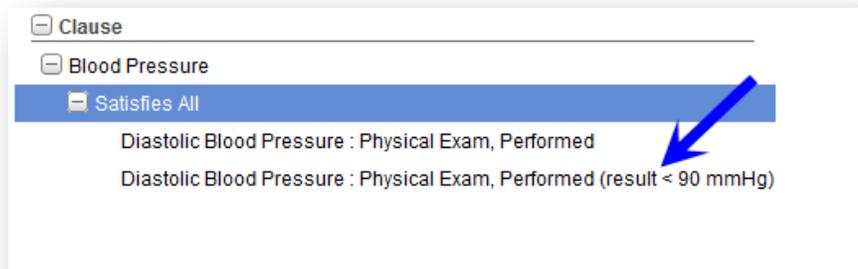
- i) Select 'Edit Attribute' from the right-click menu; select 'Result' from the Attribute dropdown; select 'less than' from the 'Mode' dropdown; and type in '90' in the Quantity text field.

Figure 164 Edit Attribute - Enter Attribute, Mode, Quantity, and Units



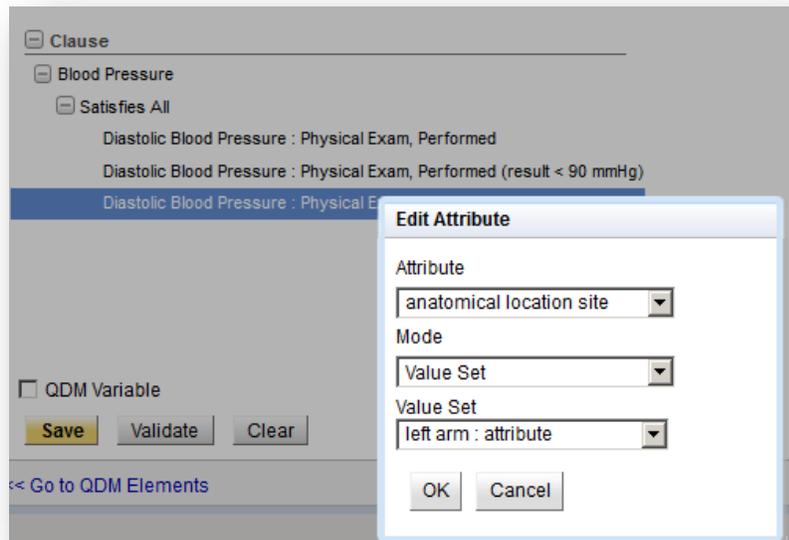
- j) Select 'mmHg' from the Unit dropdown, and select the OK button (gray) to apply the attribute to the QDM element. The attribute is displayed in parentheses to the right of the QDM element name, pictured below:

Figure 165 Attribute Added - result < 90mmHg



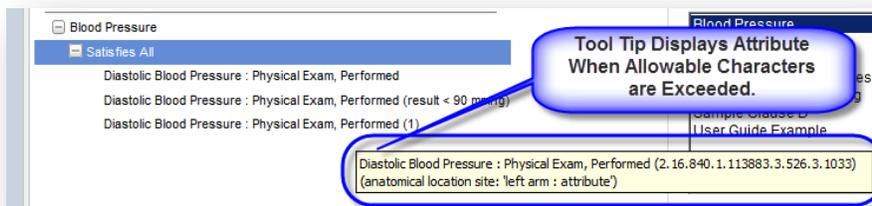
- k) Again, right-click on the Function Satisfies All and hover over the 'Add RHS' option. Select QDM Element in the expanded menu.
- l) Select the QDM element *Diastolic Blood Pressure: Physical Exam, Performed* in the QDM element list; right-click on the QDM element name Diastolic Blood Pressure: Physical Exam performed located in the last position of the displayed logic; select 'Edit Attribute' from the right-click menu; select the 'Attribute' dropdown; and select 'anatomical location site'.
- m) Next, select Value Set in the 'Mode' dropdown.

Figure 166 Edit Attribute - Add Attribute, Mode, Value Set



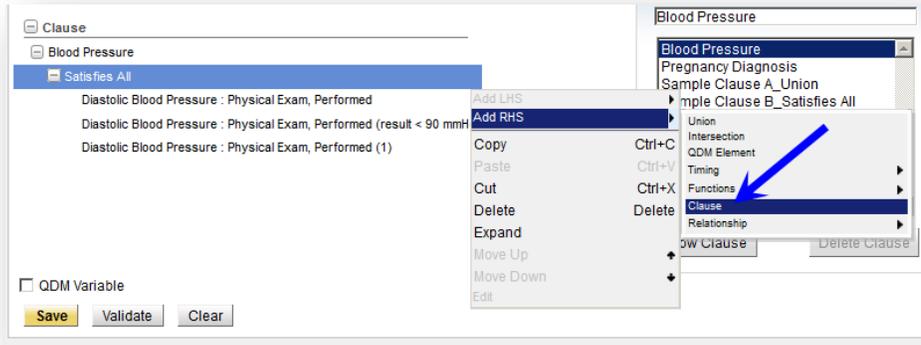
- n) Select Left Arm: attribute in the Value Set dropdown and select the OK button (gray) to apply to the QDM element. In this instance, because the added attribute exceeds the number of allowable characters, the QDM element displays a “1” in parentheses when the attribute is applied. The applied attribute can be viewed by hovering over the QDM element name and a tool tip displays the attribute in its entirety.

Figure 167 Attribute Added - anatomical location site: 'left arm: attribute'



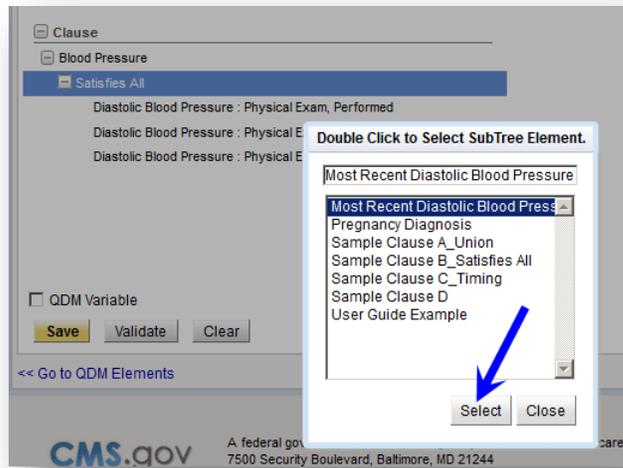
- o) Add the final right hand side (RHS) to the clause logic by right-clicking the function SATISFIES ALL, hovering over 'Add RHS', and selecting Clause in the expanded menu.

Figure 168 Add Clause to RHS



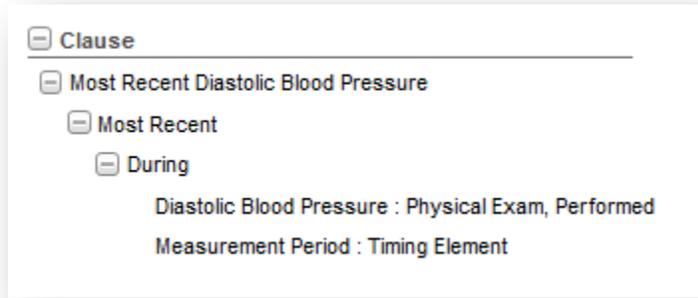
- p) Select the desired clause from the pop up box, Most Recent Diastolic Blood Pressure, by selecting the clause name and selecting the Select button (gray).

Figure 169 Select Desired Clause - Most Recent Diastolic Blood Pressure



Of note, the clause Most Recent Systolic Blood Pressure was built and stored within the Clause Library. The logic for clause Most Recent Systolic Blood Pressure is pictured below.

Figure 170 Clause Workspace View of Added Clause



q) Select the yellow Save button (yellow) to retain changes.

4. Subset Operator Clause – Union

This section describes how to build a clause using the subset operator UNION. Review the Quality Data Model for additional information about how and when to construct logic using the subset operator Union. This section is dedicated to demonstrating how to apply the subset operator Union to measure logic using the MAT.

The clause to be constructed in this example is pictured below:

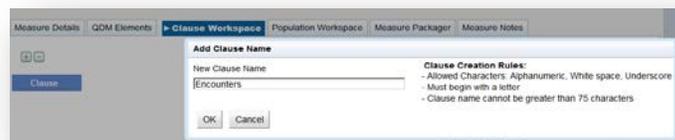
Figure 171 Human Readable - Union of Encounters Clause



a) Right-click on the word 'Clause' at the top of the workspace and select the option 'Add New Clause'.

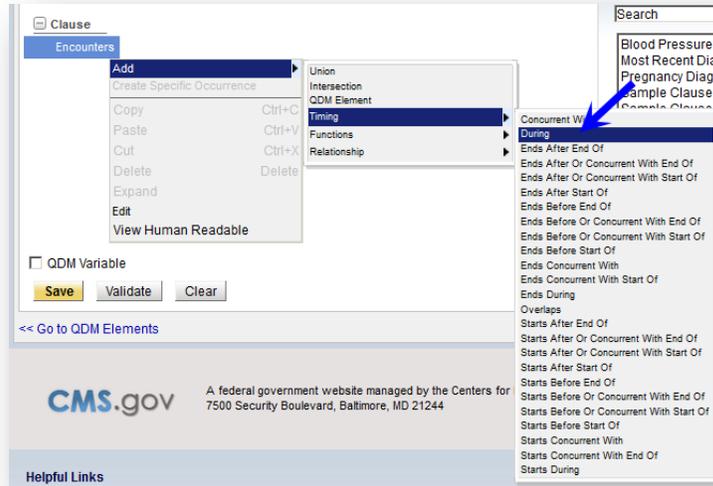
b) Provide a descriptive name in the 'Add New Clause' pop-up window. This clause will be named Encounters; therefore, type Encounters in the text field and select the OK button (gray).

Figure 172 Name Clause - Encounters



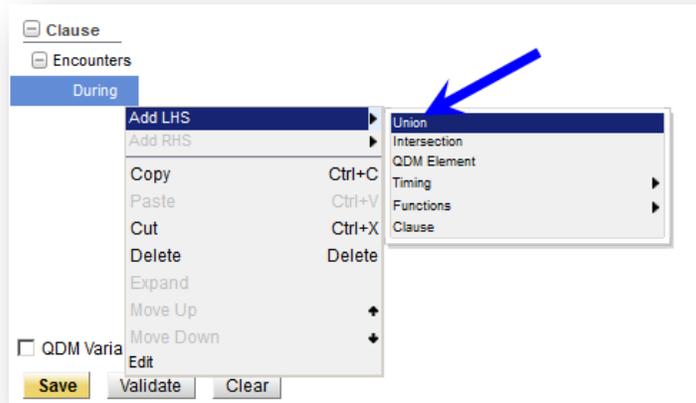
- c) Right-click on the clause name 'Encounters', hover over the 'Add', then 'Timing', and select the timing 'During'

Figure 173 Add Timing - During



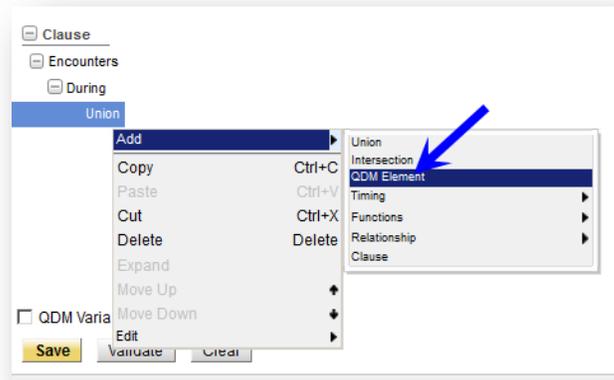
- d) Right-click on the timing 'During' which appears just below the clause name 'Encounters'. Hover over 'Add LHS' and select the subset operator Union in the expanded menu.

Figure 174 Right Click the Timing During - Add Union



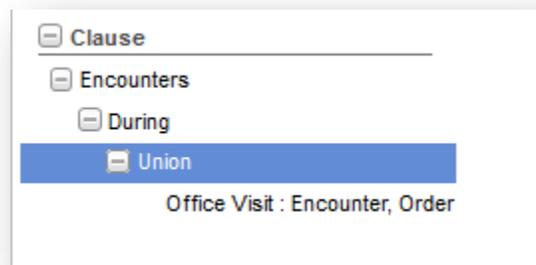
- e) Right-click on the subset operator Union and select QDM Element in the expanded menu.

Figure 175 Right Click Union - Add QDM Element



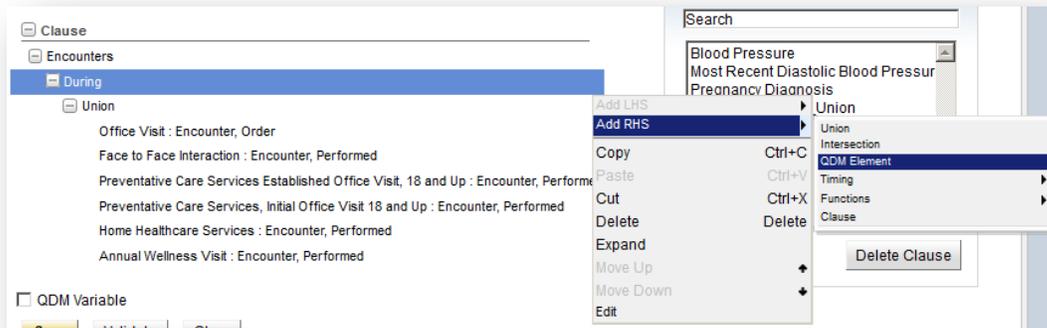
- f) From the QDM Element list box, select the first QDM Element Annual Wellness Visit by selecting the QDM element name, Office Visit: Encounter Performed. The QDM element selected appears indented and below the subset operator Union in the workspace.

Figure 176 QDM Element Added - Office Visit: Encounter, Order



- g) Repeat the actions in steps 5 & 6 to add the following QDM elements:
- Face-to-Face Interaction: Encounter Performed
 - Preventive Care Services, Establish Office Visit 18 and Up: Encounter, Performed
 - Preventive Care Services, Initial Office Visit 18 and Up: Encounter, Performed
 - Home Health Services: Encounter, Performed
 - Annual Wellness Visit: Encounter, Performed
- h) Next, select the timing 'During', hover over the 'Add RHS' option and select QDM Element.

Figure 177 Add RHS QDM Element



- i) Select the QDM element, Measurement Period: Timing Element from the QDM element list and click the Select button (gray). Measurement Period Timing Element is added at the bottom on the measure logic and the clause is complete.
- j) Select the Save button (yellow) to retain changes and the clause Encounters now appears in the Clause Library.

C. QDM Variable

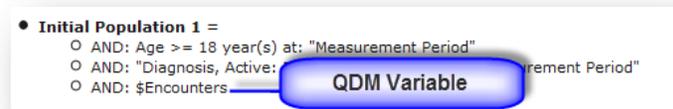
1. Designate Clause as a QDM Variable

QDM variables are segments of logic which appear repeatedly within the measure logic. MAT users have the ability to designate a clause as a QDM variable within the Clause Workspace.

When a constructed clause is identified as a QDM variable appears in the human readable export as a dollar sign followed by the clause name.

For example, if the a clause named 'Encounters' is designated as a QDM variable, everywhere the clause 'Encounters' is used through the measure logic will appear as '\$Encounters'. The logic of the QDM variable will be fully displayed in the QDM variable section of the human readable. Pictured below is an example of how the clause 'Encounters' will appear in the human readable after being designated as a QDM variable.

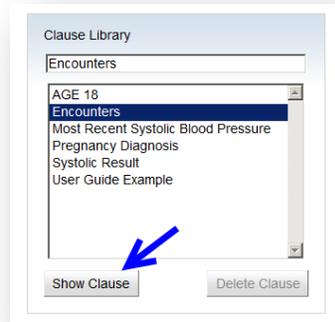
Figure 178 Human Readable - Initial Population 1 Containing QDM Variable



Instructions for designating a clause as a QDM Variable are provided below.

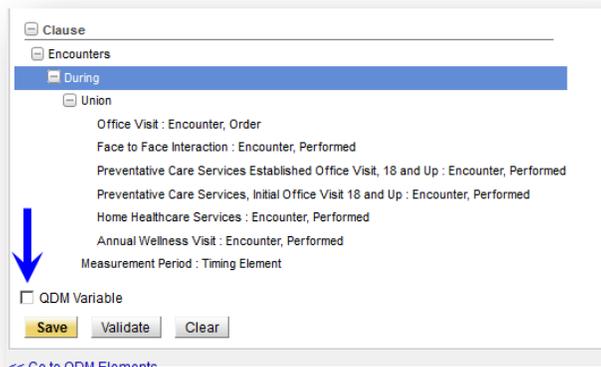
- a) Select the clause to be designated as a QDM variable from the Clause Library by selecting the clause name and selecting the Show Clause button (gray).

Figure 179 Clause Library - Show Clause



- b) Select the checkbox called 'QDM Variable' located in the bottom, left corner of the workspace where the clause logic is displayed.

Figure 180 QDM Variable Checkbox



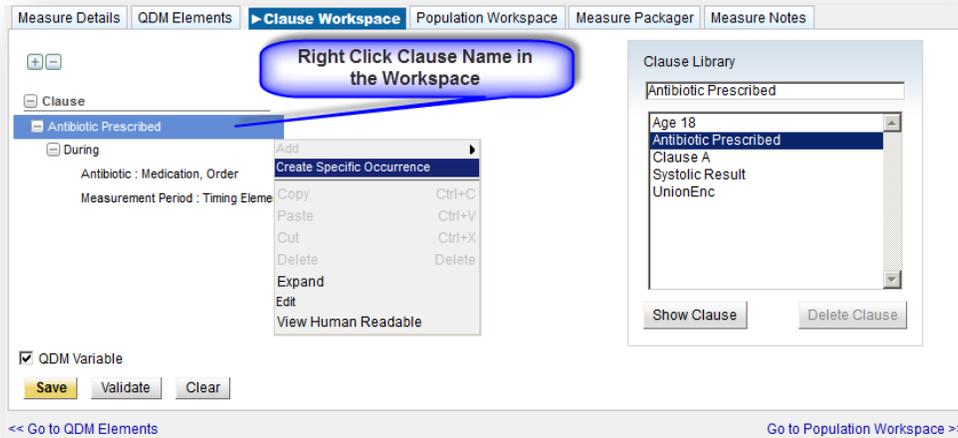
- c) Select the Save button (yellow) to retain the change made to the displayed clause.

2. Add an Occurrence to a QDM Variable

The ability to apply an occurrence to a QDM variable is added. Visit the current [QDM](#) for additional guidance for using occurred QDM variable(s) within your measure logic. QDM variables are clauses constructed in the Clause Workspace which may appear repeatedly with the measure logic. When an occurrence is assigned to a clause identified as a QDM variable, the clause, *Occurrence A of QDM variable*, is created.

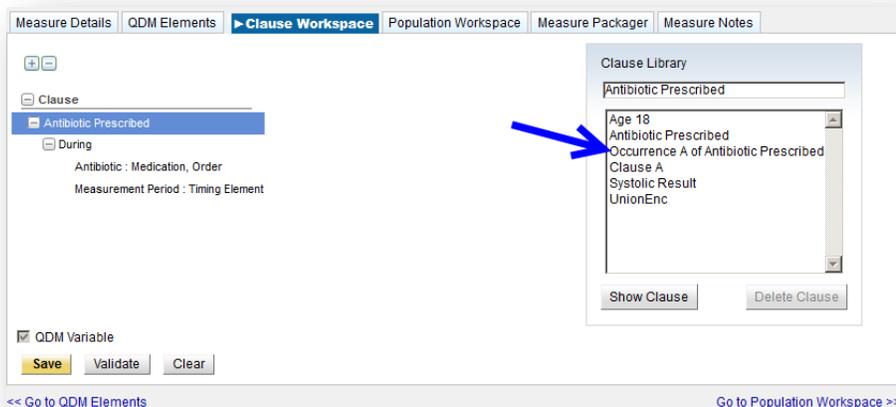
- a) In Clause Workspace, show the clause designated as a QDM variable by selecting the clause in the Clause Library and selecting the Show Clause button (gray).
- b) Right-click on the name of the clause in the Clause Workspace.

Figure 181 Clause Name - Right Click Menu



- c) Select 'Create Specific Occurrence' in the right-click menu.
- d) Observe Occurrence A of the selected QDM variable is populated in the Clause Library. (Repeat the actions in steps 1 & 2 to create additional occurrences.)

Figure 182 Clause Library - Occurred QDM Variable Listed



Note: When additional occurrences are assigned the next available letter will be assigned to the QDM variable. If the QDM variable is called Occurrence A of Variable Name, the next occurrence assigned is Occurrence B of Variable Name, and the next occurrence assigned is Occurrence C of Variable Name.

- e) Select the Save button (yellow) to retain changes prior to navigating to a new page with the tool.

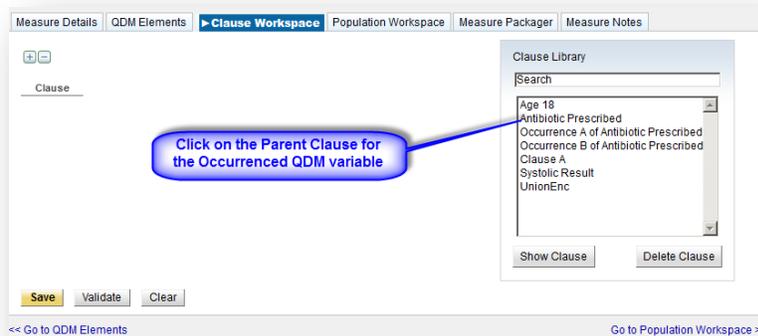
Note: Occurrence A of Antibiotic Prescribed would appear as #Occurrence A of Antibiotic Prescribed in the human readable. The QDM variable section of the human readable displays the measure logic for the parent clause.

3. Editing an Occurred QDM Variable

To edit or view the content of an occurrence clause, users must select the parent QDM variable. Complete the following steps to edit an Occurred QDM variable.

- a) In Clause Workspace, select the parent clause in the Clause Library for the Occurrence QDM variable to be edited. In the example, the parent clause is named, Antibiotic Prescribed.

Figure 183 Clause Library - Parent Clause



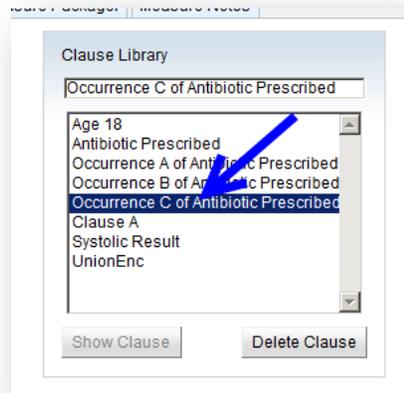
- b) Select the Show Clause button (gray) in the Clause Library.
- c) Once the parent clause is displayed, use the [edit features](#) (described later in this chapter) to make desired changes.
- d) Select the Save button (yellow) at the bottom of the workspace to retain changes.

Note: Any changes made to the parent QDM variable will be applied to all Occurrences of that QDM variable.

4. Deleting an Occurred QDM variable

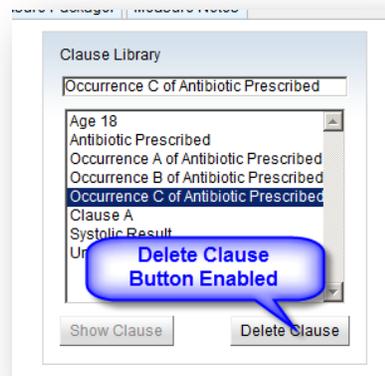
- a) Select the Occurred QDM variable to be deleted in the Clause Library.

Figure 184 Occurred QDM Variable to be Deleted is Selected



- b) If the Occurred QDM variable is not being used in the measure logic, the Delete Clause button in the Clause Library is enabled. Select the 'Delete Clause' option.

Figure 185 Clause Library - Delete Clause



- c) Observe the selected Occurred QDM variable is removed from the Clause Library.
- d) Select the Save button (yellow) at the bottom of the workspace prior to navigating from the page to retain changes.

D. Move Logic

Within Clause Workspace, segments of logic may be moved up one position or down one position. If the option to move the segment of logic up or down one position is available, the 'Move Up' and/or 'Move Down' option in the right-click menu for the highlighted segment of logic will be enabled.

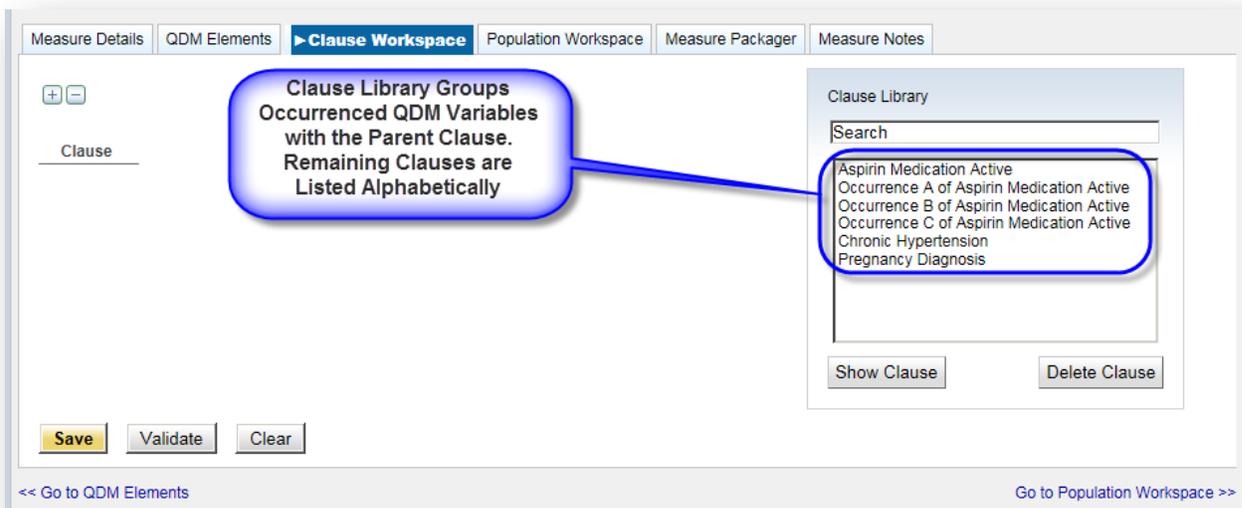
1. Highlight the segment of logic to be moved in the logic displayed within the Clause Workspace.

2. Right-click and verify the 'Move Up' option and/or 'Move Down' option is enabled with the displayed menu.
3. Select 'Move Up' to move the segment of logic up one position. Select 'Move Down' to move the segment of logic down one position.
4. Once the segment of logic is within the desired position within the displayed clause, select the Save button (yellow) to retain changes.

III. CLAUSE LIBRARY

The Clause Library is located on the right-side of the Clause Workspace. All clauses constructed in the Clause Workspace are listed in the Clause Library in alphabetical order. Occurred clauses (Occurrence A of Antibiotic Prescribed, Occurrence B of Antibiotic Prescribed) are paired with the parent clause and not listed alphabetically among all clauses. Users may perform a refined search to locate a specific clause, select a previously constructed clause to display in the Clause Workspace to view or edit, and delete unused clauses.

Figure 186 Clause Library - Clauses Listed Alphabetically

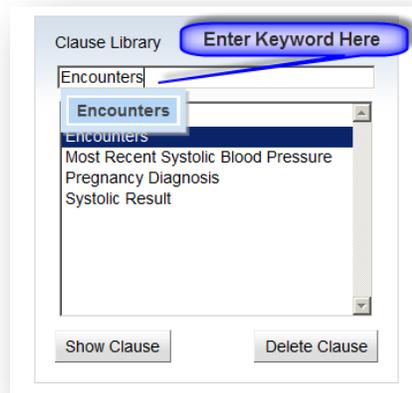


A. Perform a Search within the Clause Library

Users may perform a refined search within the clause library. To do so, complete the following steps.

1. Enter a keyword or the clause name within the 'Search' text field of the Clause Library located at the top of the Clause Library. Items matching the keyword are displayed in an expanded window below the text field.

Figure 187 Clause Library - Keyword Search



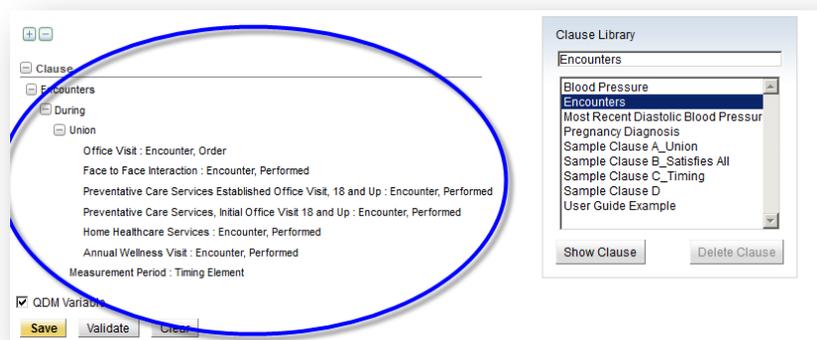
2. Select the desired clause name and the clause is highlighted within the Clause Library.
3. Next perform the desired action for that clause by selecting the Show Clause button (gray) or the Delete Clause button (gray). Both actions are described next.

B. Display a Previously Constructed Clause

To use the Clause Library to select a specific clause to display in the Clause Workspace for viewing or editing, complete the following steps.

1. [Perform a refined search](#) in the Clause Library or select the name of the clause to display.
2. Once clause name is highlighted, select the Show Clause button (gray).
3. The clause displays in the workspace to the left of the Clause Library.

Figure 188 Clause Workspace - Clause (Encounters) Displayed



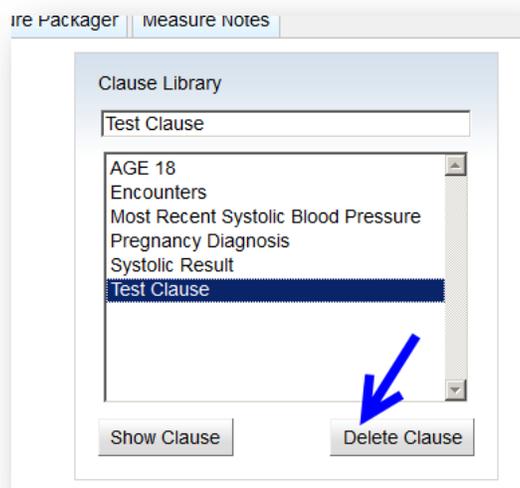
4. After viewing and/or editing the displayed clause and saving changes, clear the Clause Workspace by selecting the Clear button (gray) below the clause logic.

C. Delete a Previously Constructed Clause

In the Clause Library, users may select a clause to delete. Only unused clauses are eligible for deletion. If the selected clause is not being used within the measure logic of the Population Workspace or being used as part of another clause in Clause Workspace, the delete option is enabled. Once a clause is removed from the Clause Library it may not be retrieved. Directions for deleting a clause are provided next.

1. Perform a refined search in the Clause Library or select the name of the clause to delete.
2. Select the Delete Clause button (gray). (The clause must not be displayed in the workspace to be deleted. If the Delete Clause button is disabled for an eligible clause, verify the clause is not being displayed in the workspace to the right of the Clause Library).

Figure 189 Clause Library - Delete Clause (Test Clause)



IV. EDIT A CLAUSE

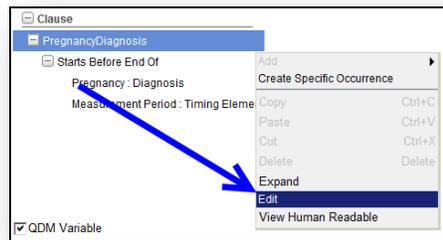
The ability to edit an existing clause is available within the Clause Workspace. Users can edit a clause name, a QDM element, Timing, Function, Relationship, and/or Attribute being used with the clause logic. Instructions for editing the different segments within Clause Workspace are provided below.

A. Edit Clause Name

MAT users have the ability to edit a clause name. To do so, complete the following steps.

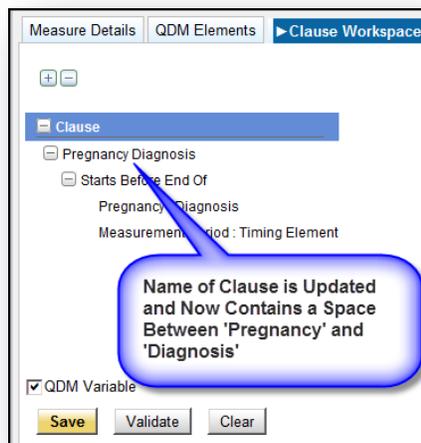
1. Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button.
2. Right-click on the clause name displayed in the workspace to the right of the Clause Library and select the 'Edit' option from the menu options.

Figure 190 Clause Workspace - Pregnancy Diagnosis (Edit)



3. In the pop up window perform the desired edits within the text field where the existing clause name is displayed.
4. Select the OK button.

Figure 191 Clause Workspace - Clause Name Edited



5. Select the Save button to retain changes to the clause name.

B. Edit QDM Element

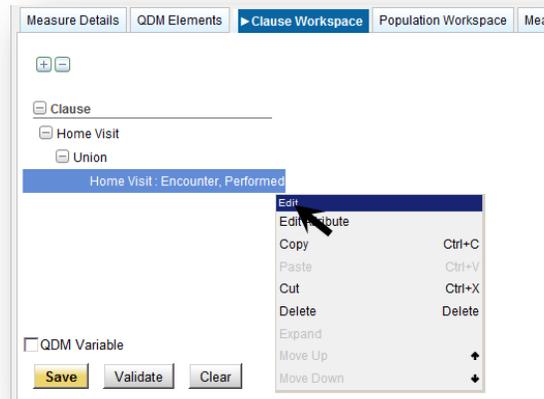
MAT users have the ability to edit a QDM element used in a constructed clause. MAT users can use the edit function to change which QDM element is used in the measure logic.

[Modifications to the selected QDM element](#) are made within the Applied Elements sub-tab of the MAT. To do so, complete the following steps.

1. Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button (gray).
2. Right-click on the name of the QDM element to edit within the clause logic displayed in the workspace to the left of the Clause Library.

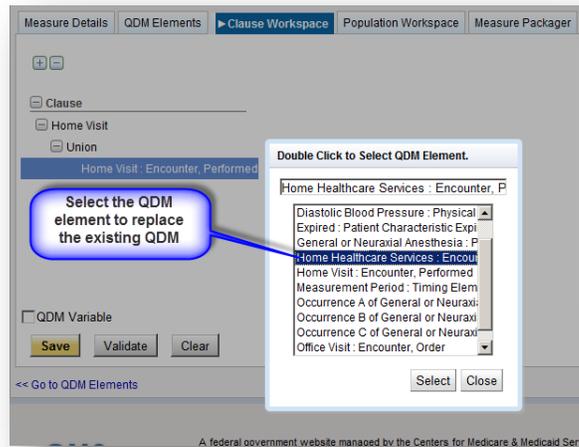
3. Select the 'Edit' option from the displayed menu. The QDM element list box is displayed.

Figure 192 Clause Workspace - Edit QDM Element (Home Visit: Encounter, Performed)



4. Double click on the name of the QDM element to replace the existing QDM element, or highlight the new QDM element and click the Select button (gray).

Figure 193 QDM Element Pop-up - Select New QDM Element



5. Select the Save button (yellow) to retain changes to the clause name, and confirm the message confirming the changes are successfully saved.

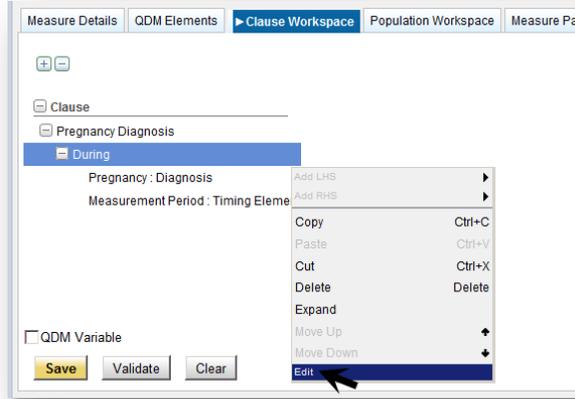
C. Edit Timing

MAT users have the ability to edit a Timing being used in a constructed clause. MAT users can use the edit function to change which Timing is being used in the measure logic. To do so, complete the following steps.

1. Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button.

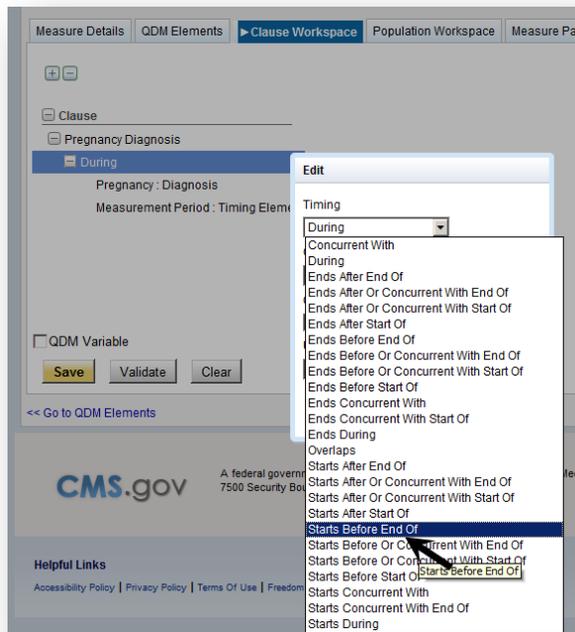
2. Right-click on the name of the Timing to edit in the measure logic displayed in the workspace to the left of the Clause Library.

Figure 194 Clause Workspace - Edit Timing (During)



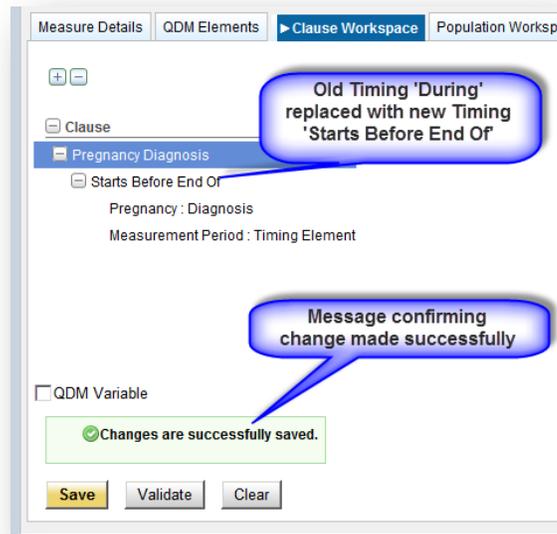
3. Select the 'Edit' option from the displayed menu. An Edit pop up is displayed.
4. Double click the desired Timing from the dropdown box in the Edit pop-up, or click on the Timing name and click on the OK button (gray).

Figure 195 Edit Timing Pop-up - Select New Timing (Starts Before End Of)



5. The new timing replaces the old timing within the measure logic. Select the Save button to retain changes to the clause.

Figure 196 Success Message - Changes Saved

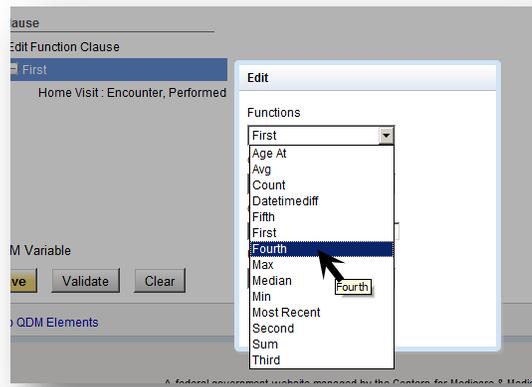


D. Edit Function

MAT users have the ability to edit a Function used in a constructed clause. MAT users can use the edit function to change which Function is used in the measure logic.

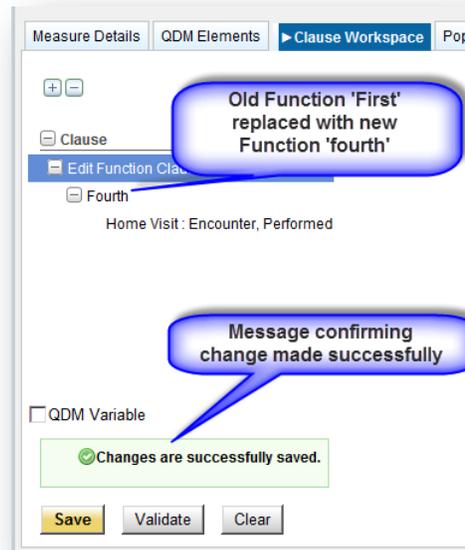
1. Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button (gray).
2. Right-click on the name of the Function (i.e. First) to edit in the measure logic displayed in the workspace to the left of the Clause Library.
3. Select the 'Edit' option from the displayed menu. An Edit pop up is displayed.
4. Click on the desired Function (i.e. Fourth) from the dropdown box in the Edit pop-up.

Figure 197 Clause Workspace - Edit Function (First)



5. Click on the OK button (gray).
6. The new Function (i.e. Fourth) replaces the old Function (i.e. First) within the measure logic. Select the Save button (yellow) to retain changes to the clause.

Figure 198 Success Message - Changes Saved



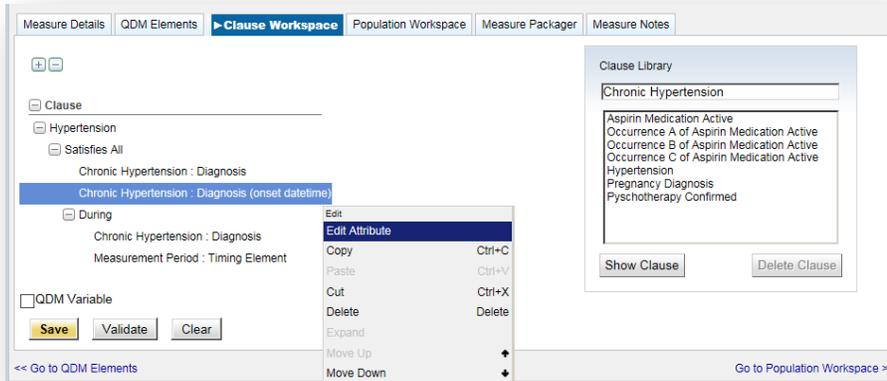
E. Edit Attribute

MAT users have the ability to edit an attribute added to a QDM element which is used in a constructed clause. MAT users can use the edit function to modify the details of an attribute for a specific QDM element. To do so, complete the following steps.

1. Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button.

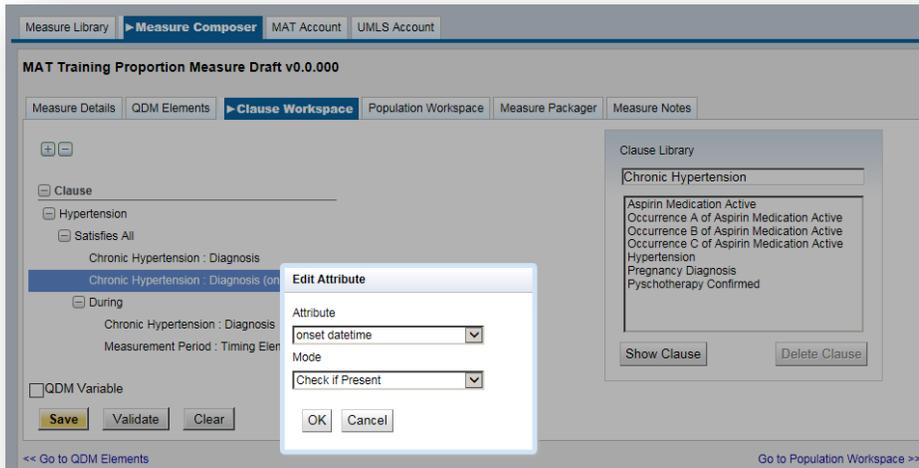
2. Right-click on the name of the QDM element with the attribute to be edited in the measure logic displayed in the workspace to the left of the Clause Library.

Figure 199 Clause Workspace - Edit Attribute Right-Click Menu Option



3. Select the 'Edit Attribute' option from the displayed menu. An Edit pop up is displayed.

Figure 200 Edit Attribute Pop-up Window



4. Make the desired modifications to the applied attribute by updating the desired fields in the Edit pop-up.
5. Select the gray OK button. The edited attribute replaces the old QDM element attribute within the measure logic.
6. Select the Save button to retain changes to the clause.

V. VIEW HUMAN READABLE

MAT users may view the human readable export for the displayed clause within Clause Workspace. A separate window is generated and displays the measure logic as it will appear in the human readable of the measure export. The window displays the clause name, followed by the logic as it appears in the human readable export. The clause name will not appear in the human readable.

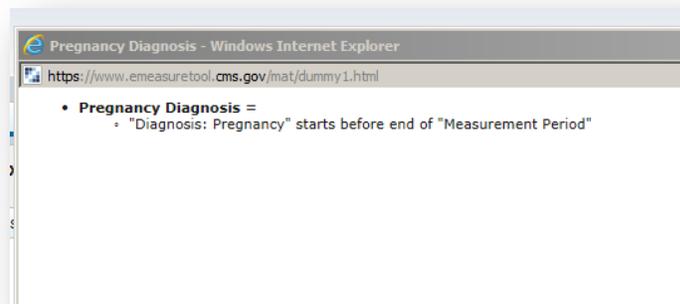
Note: If using Firefox as the internet browser, users may need to allow pop-ups to view the human readable.

- 1) Perform a refined search or select the name of the clause to edit in the Clause Library, and select the Show Clause button.
- 2) Right-click on the name of the clause in the workspace to the left of the Clause Library.
- 3) Select 'View Human Readable' in the menu.

Note: The MAT is able to produce a view of the human readable only for valid clauses. An error message will be populated if the selected clause is invalid or contains invalid components such as an invalid attribute or a QDM with an invalid datatype. Additionally, if a clause nested within a clause is invalid, the view human readable option will not be successful and an error message displays.

- 4) A separate window is opened displaying the clause name followed by the clause logic as it appears in the HTML human readable of the export.

Figure 201 Human Readable View of Selected Clause



- 5) Select the "X" in the upper, right corner of the page to close the window and return to the Clause Workspace.

VI. VALIDATION IN CLAUSE WORKSPACE

There is a validation tool in the Clause Workspace. By validating the clause in Clause Workspace the measure author can ensure a valid clause is being applied in the Population Workspace, thus ensuring success when packaging a measure. The following validations are performed when using the Validation feature in Clause Workspace:

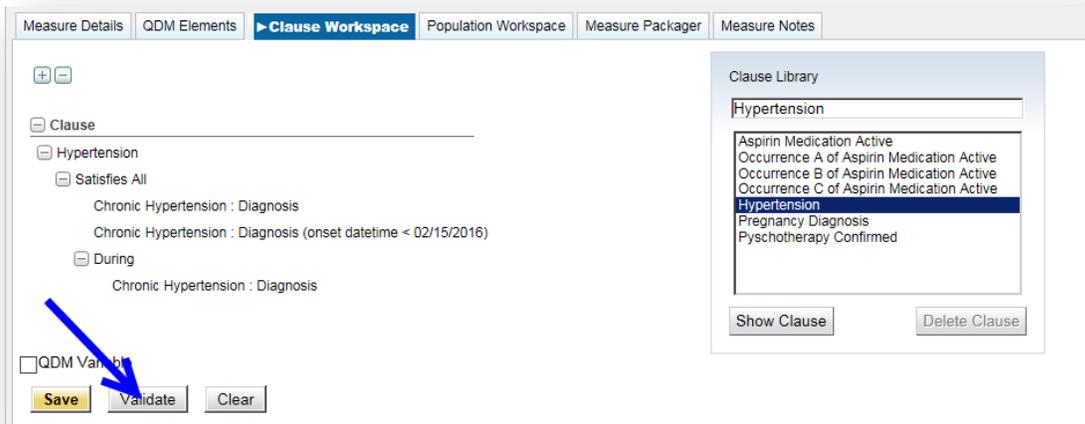
- A named clause contains measure logic. Clauses with no measure logic are invalid.
- The left hand side (LHS) and right hand side (RHS) are complete when using a timing (i.e. During) or relationship (i.e. fulfills).
- When using the functions Satisfies All and Satisfies Any, the left hand side contains one QDM Element and there is two or more RHS. Therefore, Satisfies All and Satisfies Any must contain at least 3 child nodes.
- Only valid attributes are being used based on the most recent QDM.
- Only QDM elements with valid datatypes are used.
- Set operators (Union and Intersection) contain at least two child nodes.
- Functions (Age At, Count, and Most Recent) contain at least one child node.
- All nested clauses contained in the validated clause are valid.
- When a Timing and/or Relationship are used, the clause must contain left hand side (LHS) logic and right hand side (RHS) logic. When using the functions Satisfies All or Satisfies Any, the clause must contain left hand side (LHS) logic and one or more right hand side (RHS) logic statements. Invalid QDM elements may be applied to the measure. For example, prior to the MAT version 4 release, a QDM element using the datatype Physical Exam, Finding may have been applied. This invalid QDM element is still available for use in the QDM element list box until it is modified or removed from the measure. This introduces the possibility that a QDM element using an invalid datatype could be used within the clause logic.
- When incomplete timings, relationships, and satisfies functions or QDM elements with invalid datatypes are used in the clause logic for the displayed clause, the invalid segment of logic will appear in red when the validation is performed. User may then use the edit functions to complete incomplete logic or replaces invalid QDM elements.

Note: Appendix F provides validation guidance to assist MAT user attempting to resolve validation errors.

Directions for performing a validation are provided next.

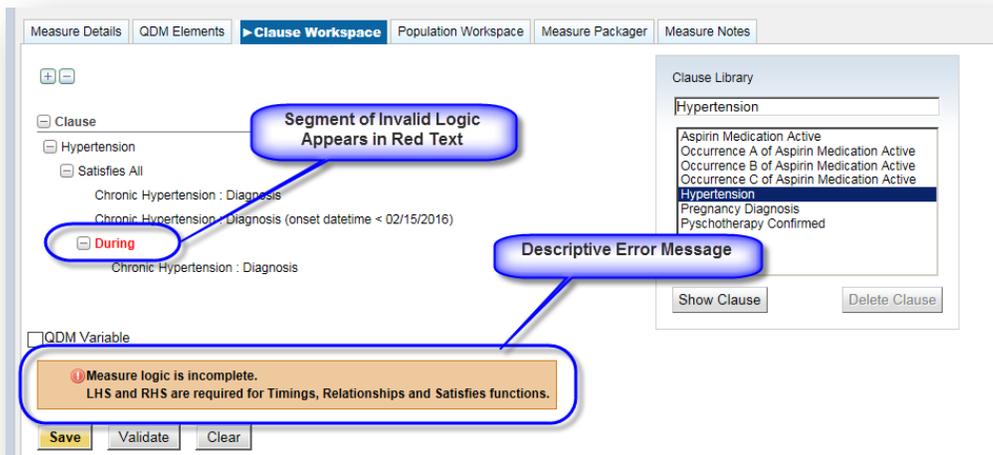
- 1) Perform a refined search or select the name of the clause to be edited in the Clause Library, and select the Show Clause button.
- 2) Select the Validate button (gray) located below the displayed logic in Clause Workspace.

Figure 202 Clause Workspace - Validate Clause



- 3) A success message displays if there no validation errors are present. Invalid segments of logic are highlighted in red and a warning message displays.

Figure 203 Clause Validation - Invalid Clause Logic



- 4) Use edit options in the Clause Workspace to correct the highlighted areas of logic and save the changes. Repeat step 2 to ensure the changes result in a successful validation.

Navigation Tip: After clauses are built within the Clause Workspace, navigate to the Population Workspace to add the constructed clauses to selected measure populations (i.e. Initial Population 1, Numerator 1, Denominator 1, etc...). Instructions for adding clauses to populations in Population Workspace are provided in the next chapter.

Chapter 10: Measure Composer—Population Workspace

Chapter Overview: The Population Workspace is designed to allow measure developers the ability to add clauses to define specific populations. This chapter will provide step by step instructions for adding logical operators and clauses to define measure populations. Additional features of this page including adding additional populations, validation, adding inline comments, view the human readable for a population, and viewing clause logic for specific clause are also described.

The Population Workspace is the fourth tab within the Measure Composer. The Population Workspace contains all required and optional populations for the measure scoring type. Depending on the measure scoring type, up to three additional sub-tabs display: Populations, Measure Observations, and Stratification.

Figure 204 Population Workspace – Proportion Measure

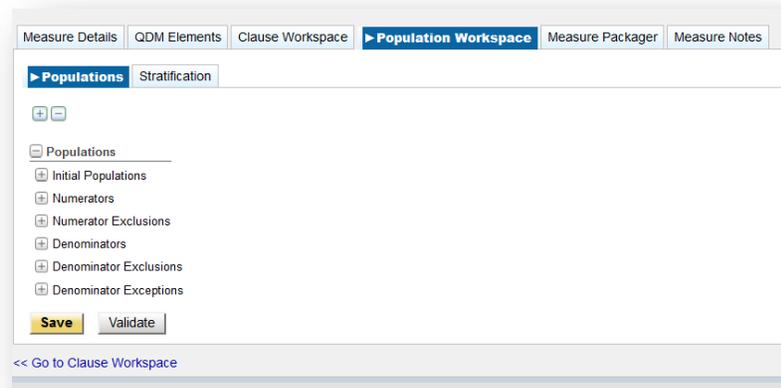


Figure 205 Population Workspace - Ratio Measure

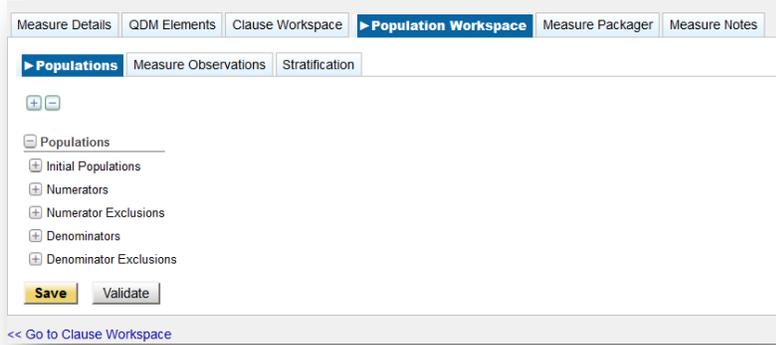


Figure 206 Population Workspace - Continuous Variable Measure

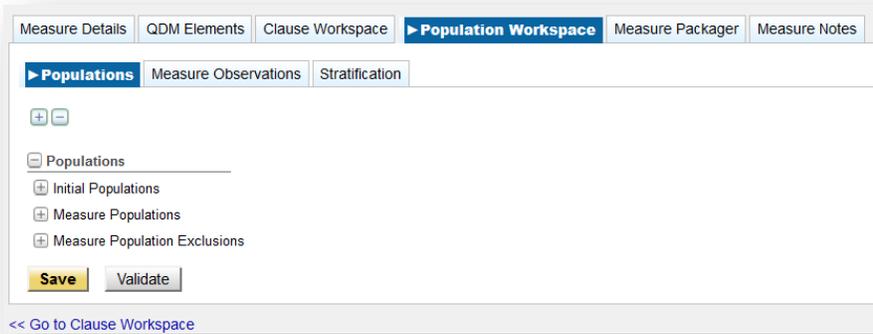
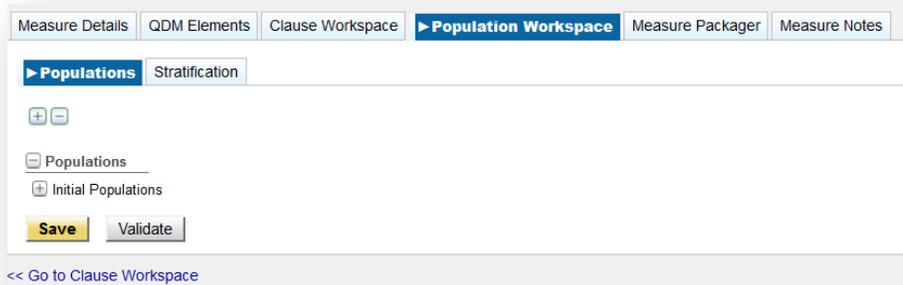


Figure 207 Population Workspace - Cohort Measure



The Populations page displays by default when Population Workspace is selected. Measure populations are listed on the left hand side of the page. Users have the ability to control the amount of data being displayed using the expand and collapse functions.

The Population Workspace is organized by populations. The parent populations (Initial Populations, Numerators, Numerator Exclusions, Denominators, etc...) are listed and each parent population will

contain one or more child populations (Initial Population 1, Initial Population 2, Denominator 1, Denominator 2, etc.).

Users may add or remove logical operators or clauses constructed in Clause Workspace to measure populations. Additional measure populations may also be added or removed. Inline comments may be added to logical operators and/or clauses. Prior to exiting the Population Workspace, users are prompted to save changes. Changes made within the Population Workspace are saved by selecting the Save button located in the bottom, left corner of the page. Measure Observations and Stratification are defined within the Population Workspace.

Users may also choose to validate the content of the Populations, Measure Observations, or Stratification. Expanded instructions for these features are provided below.

Short cut options which may be used in the Population Workspace are listed below:

- Ctrl + C to Copy
- Ctrl + V to Paste
- Ctrl + X to Cut

I. DEFINING POPULATIONS

The required and optional populations for the measure scoring type will be listed within the Populations sub-tab of the Population Workspace. To define a measure population, users will add logical operators and clauses built within the Clause Workspace.

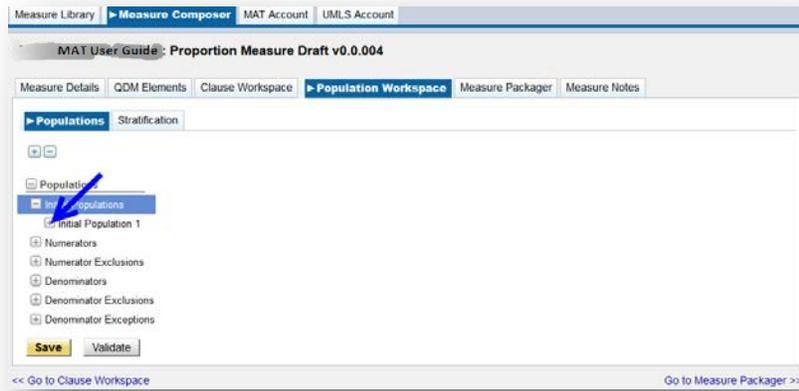
A. Adding a Logical Operator to a Population

There are four available logical operators available to add to a measure population AND, AND NOT, OR, and OR NOT. These are used to link the measure logic clauses built within Clause Workspace. The top level logical operator is the first operator in the logic tree following the population name. The top level logical operator may not be removed. The top level logical operator for the following populations defaults to 'AND': Initial Populations, Numerators, Denominators, and Measure Populations. The top level logic operator for the following populations defaults to 'OR': Numerator Exclusions, Denominator Exclusions, Denominator Exceptions, and Measure Population Exclusions.

Instructions for adding a logical operator to a measure population are provided next.

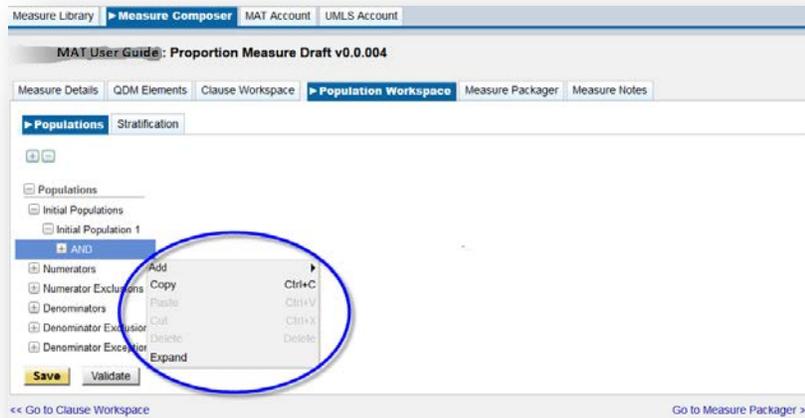
1. On the Populations sub-tab of the Population Workspace, identify the population where the logical operator will be added.
2. Select the Expand button to the left of the population name.
3. Select the Save button prior to navigating from the Measure Observations page.
4. Next, select the Expand button next to the specific population within the parent population for the logical operator to be added. In this example, a logical operator will be added to 'Initial Population 1'.

Figure 208 Population Workspace - Initial Population 1 (Expand)



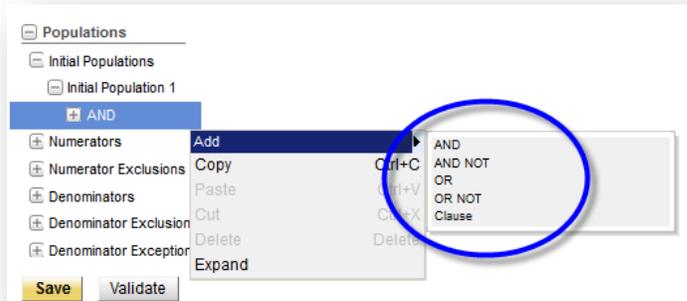
5. Select the top level 'AND' and it will highlight in blue and right-click to display a menu of allowable actions.

Figure 209 Right-click Menu - Top Level AND (Initial Population 1)



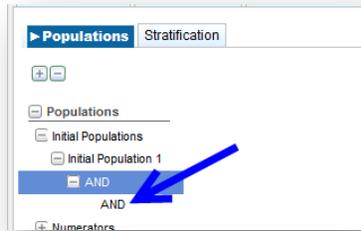
6. Select 'Add' in the displayed menu and an additional menu is displayed.

Figure 210 Expanded Right-click Menu - Top Level AND (Add Selected)



7. Select the logical operator to be added. This example adds the logical operator 'AND' to the measure population.

Figure 211 Top Level AND - Terminal Logical Operator AND Added



8. Select the Save button at the bottom, left side of the page. A success message (green background) will display.

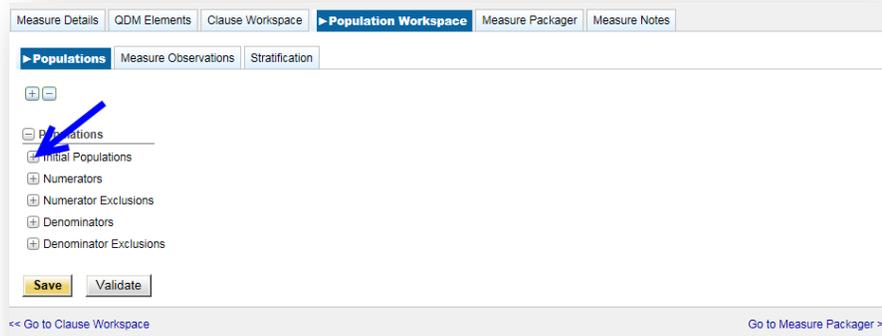
Note: Use the same steps to add a logical operator in the Measure Observation or Stratification sub-tabs. Stratification does not have a top level AND. Clauses and logical operators are added directly to the Stratum in the Stratification sub-tab.

B. Adding a Clause to a Population

Measure clauses are constructed in the Clause Workspace. For instructions regarding constructing a measure clause see [Chapter 9 Measure Composer-Clause Workspace](#). Instructions for adding a measure clause to a population within Population Workspace are provided next.

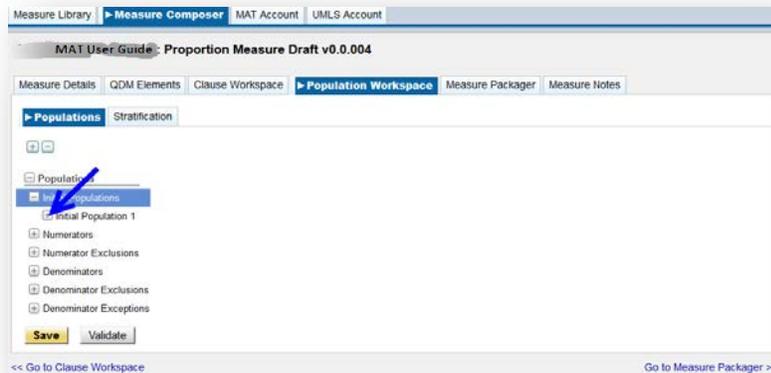
1. On the Populations sub-tab of the Population Workspace identify the population where the clause will be added.
2. Select the Expand button to the left of the population name.

Figure 212 Population Workspace - Initial Populations (Expand)



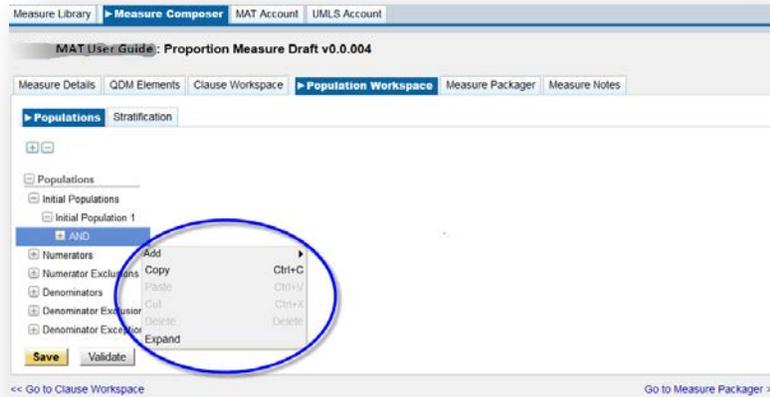
- Next, select the Expand button next to the specific population within the parent population for the logical operator to be added. In this example, a clause is added to 'Initial Population 1'.

Figure 213 Population Workspace - Initial Population 1 (Expand)



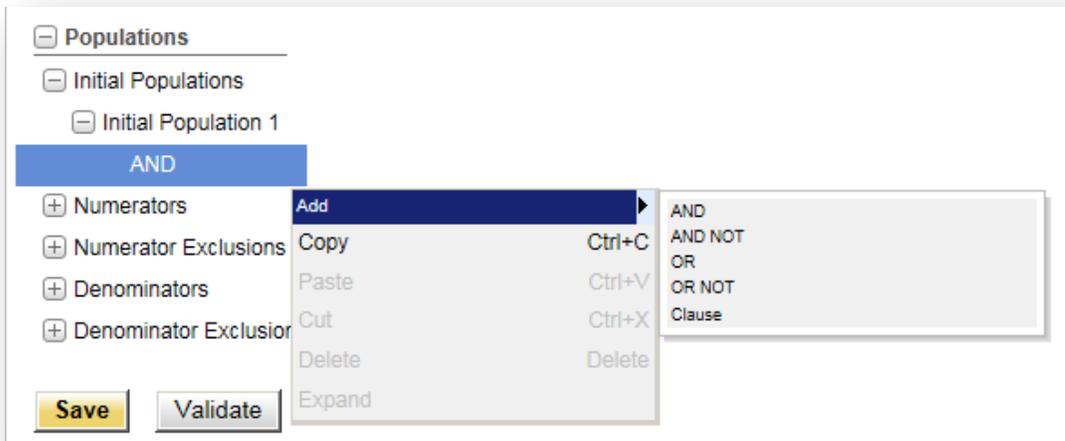
- Select the top level 'AND' and it becomes highlighted in blue. Right-click to display a menu of allowable actions.

Figure 214 Right-click Menu - Top Level AND Options



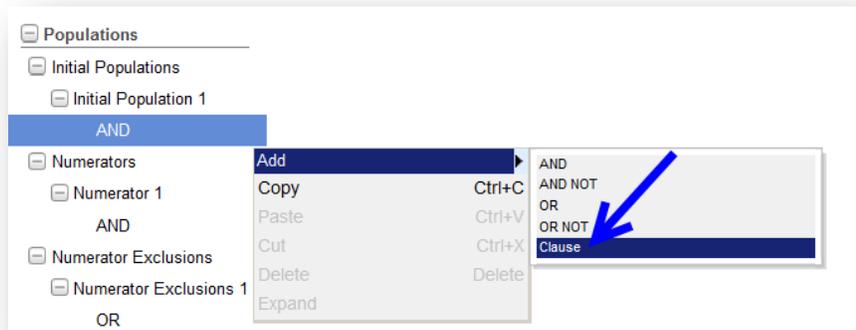
5. Select 'Add' in the displayed menu and an additional menu is displayed.

Figure 215 Expanded Right-click Menu - Add Selected



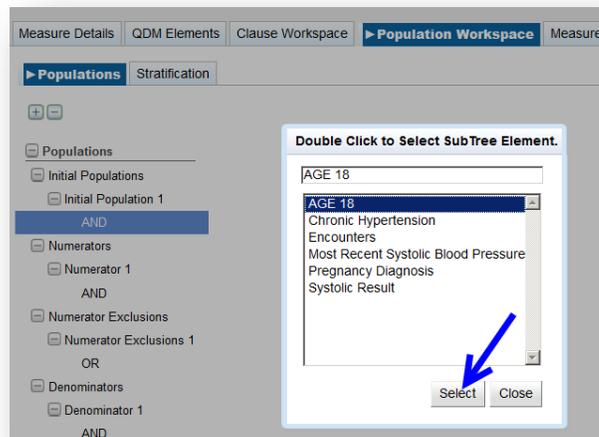
6. Select 'Clause' in the menu.

Figure 216 Expanded Right-click Menu - Add (Clause)



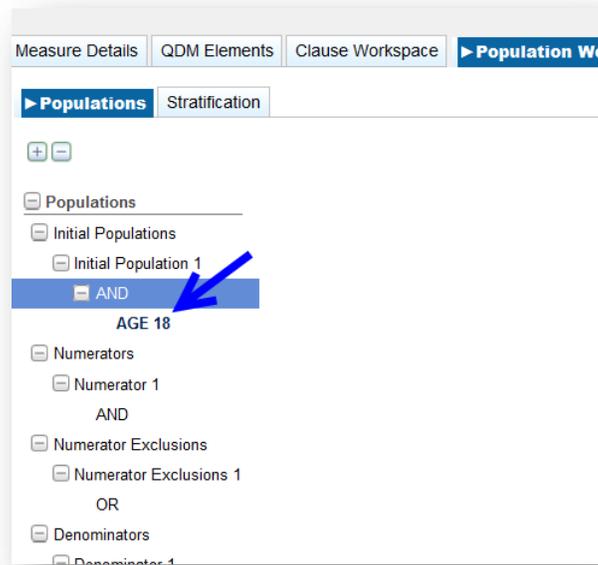
7. A pop-up displays all clauses saved in the Clause Library. Select the clause name to be added to the measure population and click the Select button.

Figure 217 Clause List Pop-up



8. The clause name appears at the bottom of any existing logic for the selected logical operator.

Figure 218 Population Workspace - Clause Added (AGE 18)



9. Select the Save button to save additions to the Population Workspace.

Note: Use the same steps to add a clause in the Measure Observation or Stratification sub-tabs. Stratification does not have a top level AND. Clauses and logical operators are added directly to the Stratum in the Stratification sub-tab.

C. Adding AND NOT or OR NOT

The function NOT was removed with the QDM update 4.0. AND NOT and OR NOT are logical operators added to the MAT to replace the function NOT in some instances.

Consult the [updated QDM](#) to determine the best way to rewrite measure logic where the function NOT is used.

After determining the logical operator AND NOT or OR NOT is to be applied to the measure, complete the following steps.

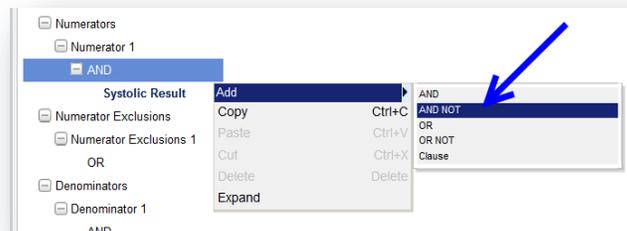
1. Right-click on the logical operator where the AND NOT is to be added.

Figure 219 Top Level Logical Operator AND Selected



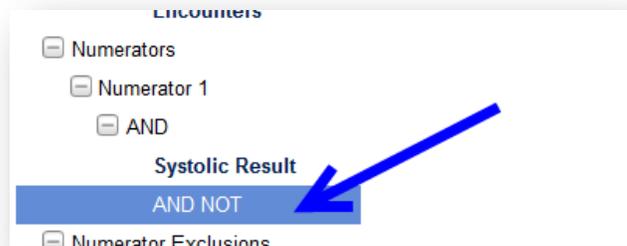
- From the right-click menu options, select either AND NOT or OR NOT. In the example provided, AND NOT is selected.

Figure 220 Expanded Right-click Menu - Logical Operator Selected (AND NOT)



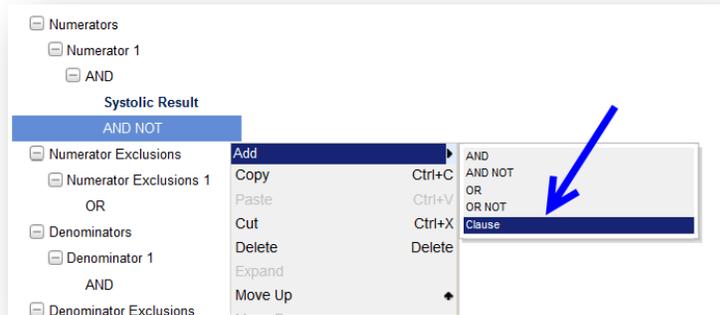
- The logical operator AND NOT is added below the existing logic for the selected logical operator.

Figure 221 Terminal Logical Operator Added (AND NOT)



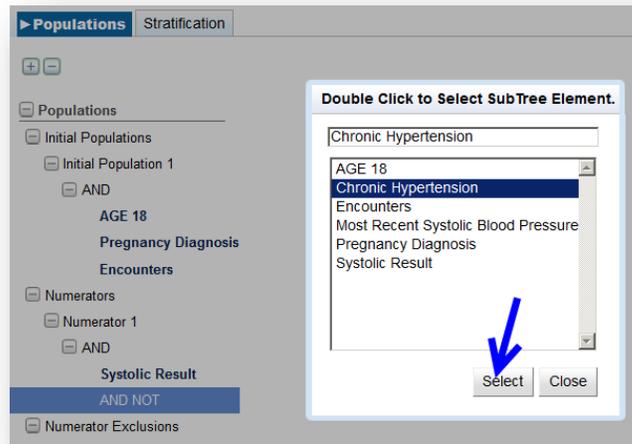
- Right-click on the logical operator AND NOT and select 'Clause' from the expanded menu.

Figure 222 Expanded Right-click Menu - Clause Selected



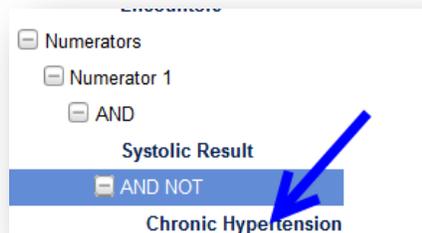
5. Select the desired clause and click on the Select button (gray).

Figure 223 Available Clauses Pop-up Window



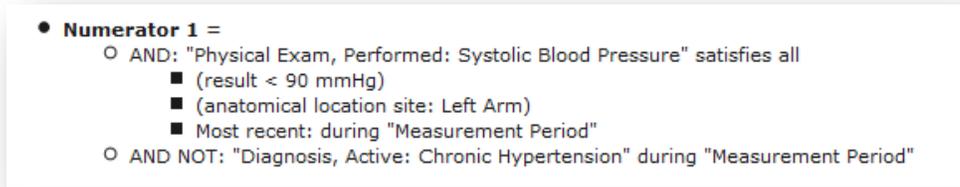
6. The clause is added below the logical operator AND NOT.

Figure 224 Clause (Chronic Hypertension) Added



7. Although the logical operator AND NOT appears to be a child of the logical operator AND, the human readable displays as pictured below.

Figure 225 View Human Readable (Numerator 1)



II. ADDING ADDITIONAL POPULATIONS

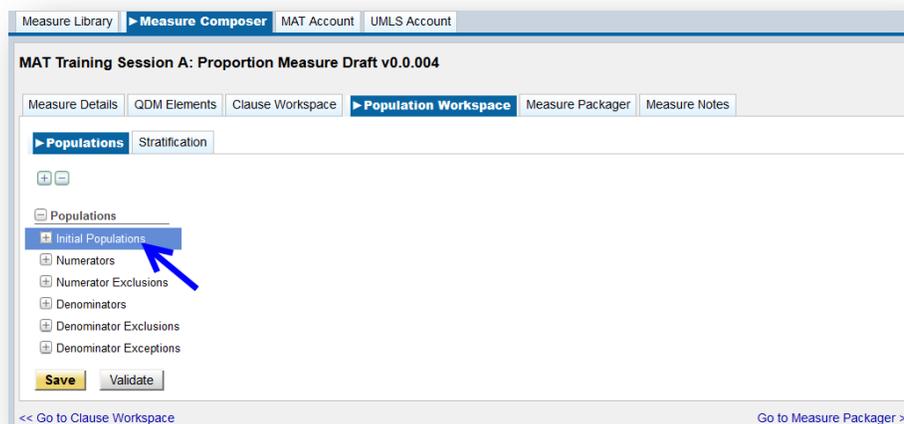
Additional measure populations, measure observations and stratification may be added. For example, there may be more than 1 Initial Population for a selected measure. Initial Population 1 is available by default, but the user has the option of adding additional populations, if desired. Measure populations present in the Population Workspace depending on measure scoring type are as follows: Initial Populations, Numerators, Numerator Exclusions, Denominator, Denominator Exclusions, Denominator Exceptions, Measure Populations, and Measure Population Exclusions.

A. Populations

Step by step instructions for adding an additional population in the Populations sub-tab are provided next.

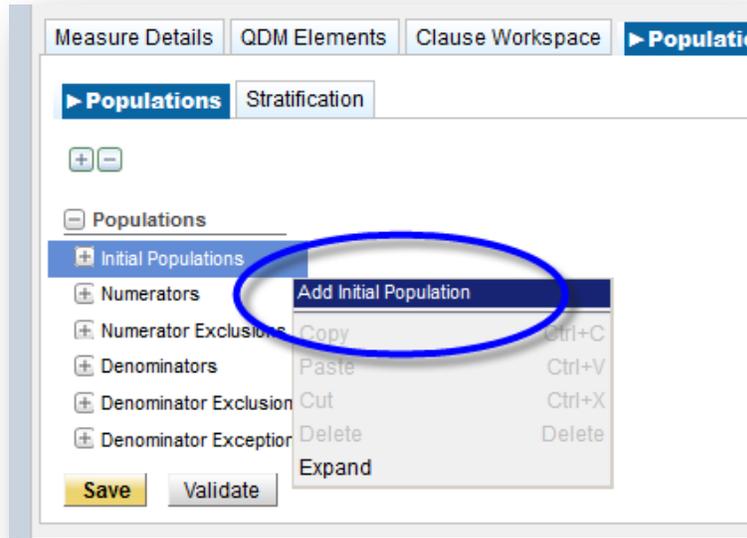
1. Select the Population Workspace tab of Measure Composer.
2. Highlight the name of the population type to be added in the Populations list by selecting the existing population name.

Figure 226 Population Workspace - Select Desired Population (Initial Populations)



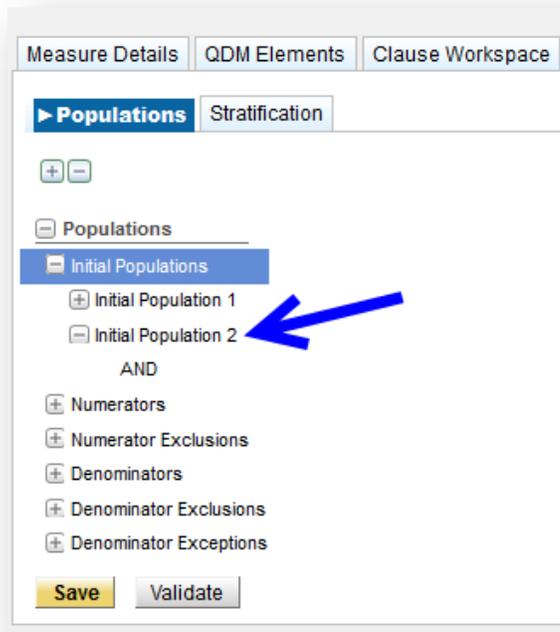
3. Right-click to display the menu of allowable actions.
4. Select 'Add Initial Population' in the right-click menu.

Figure 227 Population Workspace - Add Initial Population



5. The added population displays just below the last population listed. In this example, 'Initial Population 1' is the previous population; therefore the new population is titled 'Initial Population 2'. (The next available integer is assigned to the new population. Therefore, the next Initial Population added will be labeled 'Initial Population 3'.)

Figure 228 Population Workspace - Initial Population 2 Added



6. Select the Save button to save changes. A success message (green background) displays.

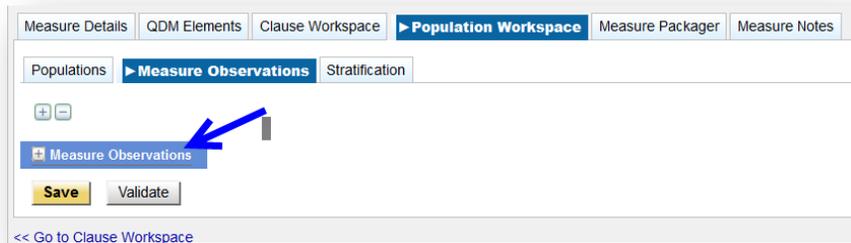
B. Measure Observations

Step by step instructions for adding one or more Measure Observations in the Measure Observation sub-tab are provided next.

Note: Measure Observations constructed prior to the MAT v4.0.2 release contain a top level AND. To create valid logic, the top level AND must be deleted and then the desired clause added to the Measure Observation. The measure observation logic will fail validation and measure packaging will not be successful when a top level AND remains in the Measure Observation.

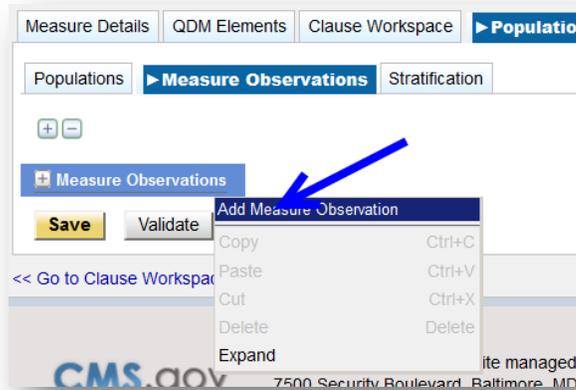
1. Navigate to the Measure Observations sub-tab of the Population Workspace.
2. Right-click on Measure Observations.

Figure 229 Population Workspace - Measure Observations



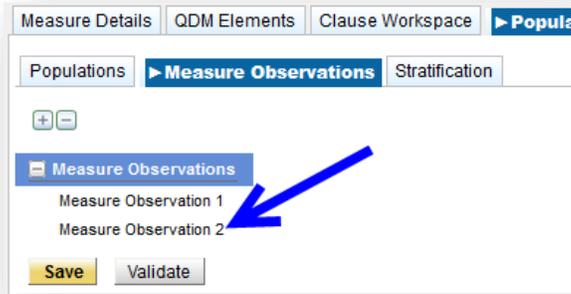
3. Select 'Add Measure Observations' from the displayed menu.

Figure 230 Population Workspace - Add Measure Observations



4. Observe the added Measure Observation in the workspace.

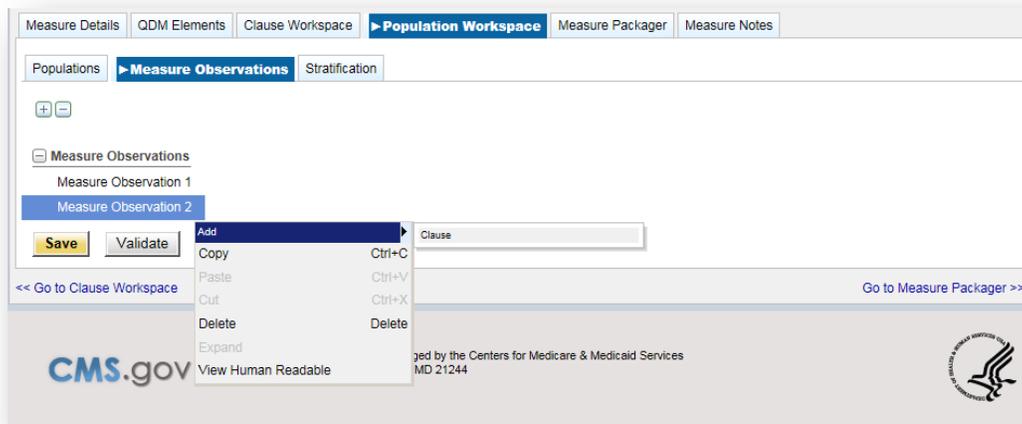
Figure 231 Population Workspace - Measure Observations 2 Added



Note: Within the Measure Observation page of the MAT, the Measure Observation will retain its assigned number even if one of the existing Measure Observation is deleted. In other words, Measure Observation 2 will remain Measure Observation 2, even after Measure Observation 1 is deleted from the measure. If only Measure Observation 2 remains and a new Measure Observation is added, it will be named Measure Observation 3. Using this same example, if Measure Observation 2 and Measure Observation 3 are included in the measure package, Measure Observation 2 is named Measure Observation 1 and Measure Observation 3 is named Measure Observation 2 in the human readable.

- To begin building the logic for a specific Measure Observation, right-click on the desired Measure Observation. The following example shows the right-click menu for Measure Observation 2. Notice there is not a top level AND for Measure Observations.

Figure 232 Right-click Menu - Measure Observation 2



- After the desired logic is added, select the Save button prior to navigating from the Measure Observations page.

C. Stratification

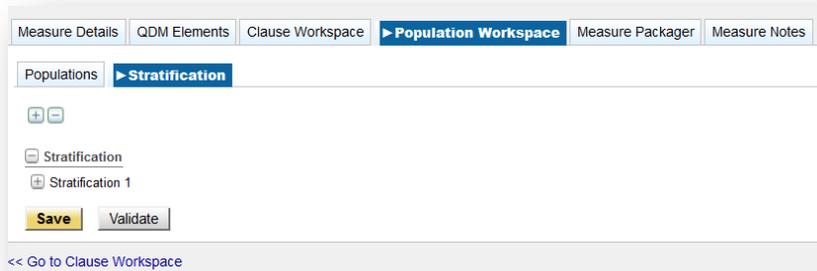
Only one Stratification may be included in a Measure Package; however, multiple Stratum may be added to a single Stratification. How to add additional Stratification and also additional Stratum within Stratification are discussed here.

1. Adding Stratification

To add additional Stratification within the Stratification sub-tab of the Population Workspace complete the following steps:

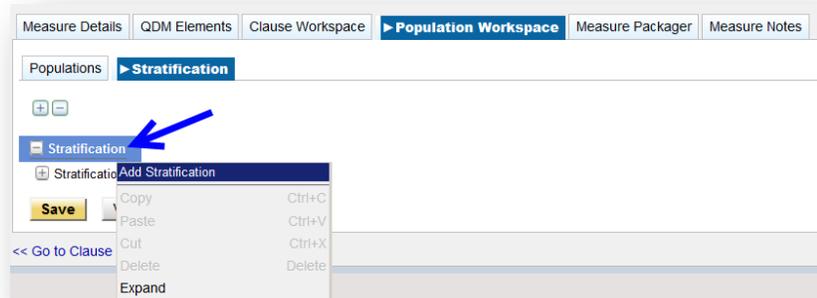
- a) Navigate to the Stratification sub-tab of the Population Workspace.

Figure 233 Population Workspace - Stratification



- b) Right-click Stratification.

Figure 234 Population Workspace - Add Stratification



- c) Select 'Add Stratification' in the displayed menu. Stratification 2 or the next sequential number will be added to the existing Stratification.

Note: Within the Stratification page of the MAT, the Stratification will retain its assigned number even if one of the existing Stratification is deleted. In other words, Stratification 2 will remain Stratification 2, even after Stratification 1 is deleted from the measure. If only Stratification 2 remains and a new Stratification is added, it will be named Stratification 3.

- d) To begin building the logic for a specific stratification, right-click on Stratum 1 to display logic building options.
- e) Select the Save button prior to navigating from the Stratification page.

2. Adding Stratum

To add additional Stratum to a single Stratification within the Stratification sub-tab, complete the following steps:

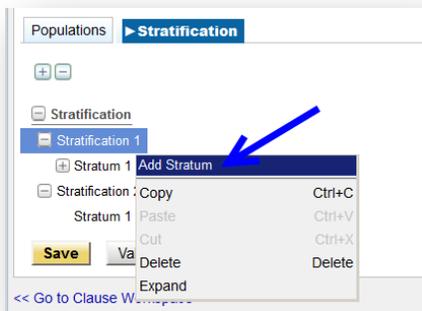
- a) Navigate to the Stratification sub-tab of the Population Workspace.
- b) Right-click on the Stratification to which the additional Stratum is to be added.

Figure 235 Stratification - Add Stratum



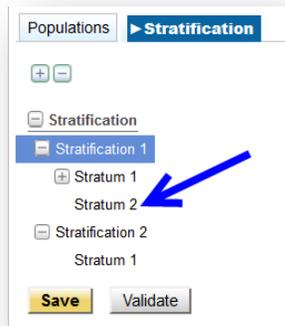
- c) Select 'Add Stratum' in the menu displayed.

Figure 236 Right-click Menu - Stratification 1



- d) Stratum 2 or the next sequential number will appear below the selected Stratification.

Figure 237 Stratification 1 - Stratum 2 Added



Note: Within the Stratification page of the MAT, the Stratum will retain its assigned number even if one of the existing Stratums is deleted. In other words, Stratum 2 will remain Stratum 2, even after Stratum 1 is deleted from the measure. If only Stratum 2 remains and a new Stratum is added, it will be named Stratum 3.

- e) To begin building the logic for a specific stratification, right-click on Stratum 1 to display logic building options.
- f) Select the Save button (yellow) prior to navigating from the Stratification page.

Navigation Tip: Only one Stratification is permitted per measure grouping. For additional instruction about creating measure groupings and creating a measure package, review [Chapter 11: Measure Composer-Measure Packager](#).

III. DELETING AN ADDED POPULATION

Unwanted added populations displayed within the **Population Workspace** and their corresponding measure logic may be removed. Use caution when deleting measure populations because they are not retrievable once changes are saved. Step by step instructions for deleting an added population are provided below.

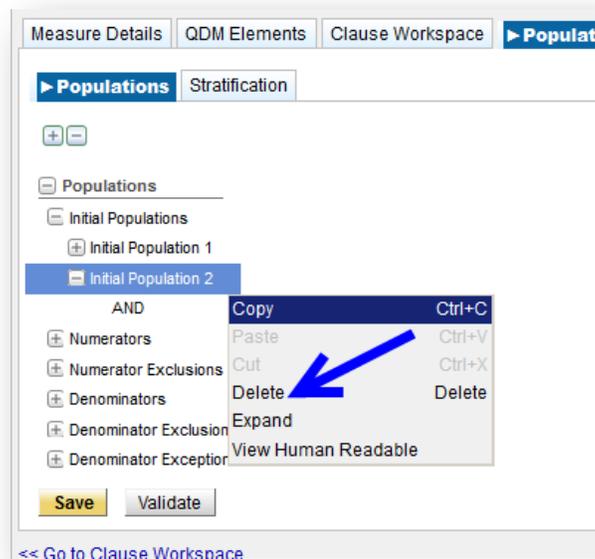
- 1) Select the Population Workspace tab of the Measure Composer.
- 2) Select the population (i.e. Initial Population 2, Initial Population 3, Denominator 2) to be removed. It will be highlighted in blue.

Figure 238 Population Workspace - Delete Population (Initial Population 2)



- 3) Right-click to display the menu of allowable actions.
- 4) Select the 'Delete' option in the right-click menu. The selected population and all the added measure logic are permanently removed.

Figure 239 Right-click Menu - Initial Population 2 (Delete)



- 5) Select the Save button in the bottom, left corner of the page to save changes. A success message (green background) will display.

Note: Use the same steps to delete a Measure Observation, Stratification, or Stratum from the Measure Observation or Stratification sub-tabs.

IV. POPULATION WORKSPACE VALIDATION

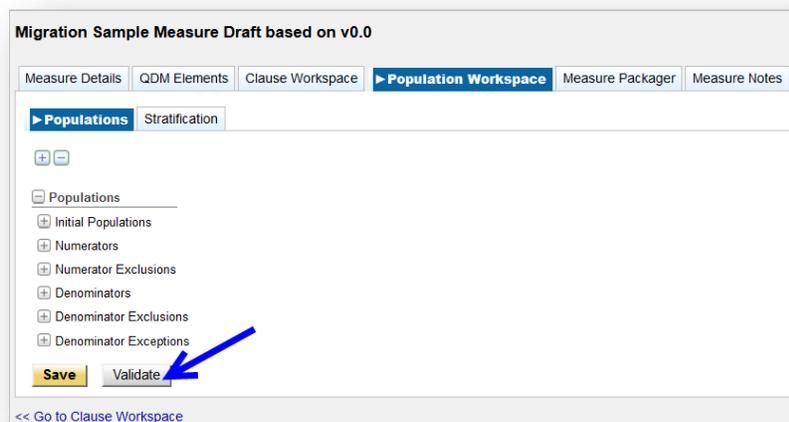
A validation of the Population Workspace is available. The Population Workspace must consist of clauses constructed in the Population Workspace and logical operators (AND, AND NOT, OR, and OR NOT). Any measure logic that does not meet these criteria fails the Population Workspace validation. To create a successful measure package, all populations included must not consist of any invalid measure logic within Population Workspace.

Note: [Appendix E](#) provides validation guidance for MAT users. Instructions for resolving invalid logic based specific error messages are provided.

Directions to perform a validation of the Population Workspace are provided next.

- 1) Within Population Workspace, select the Validate button (gray) located to the right of the Save button (yellow) at the bottom of the page.

Figure 240 Population Workspace - Validate



- 2) Invalid measure logic appears in red and a warning message displays.

If the populations in Population Workspace consist solely of logical operators and clauses constructed in the Clause Workspace, a validation success message will be generated.

- 3) After invalid measure logic is replaced with clauses constructed in the Clause Workspace and the invalid measure logic is deleted, proceed to Measure Details to create a measure package.

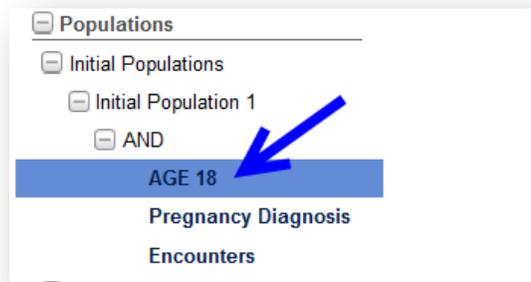
V. MOVING LOGIC

Logic within the Population Workspace may be moved up one position or down one position. This feature within the Population Workspace can be used to move clauses or logical operators up or down within the workspace.

Complete the following steps to move logic up one position or down one position within the Population Workspace.

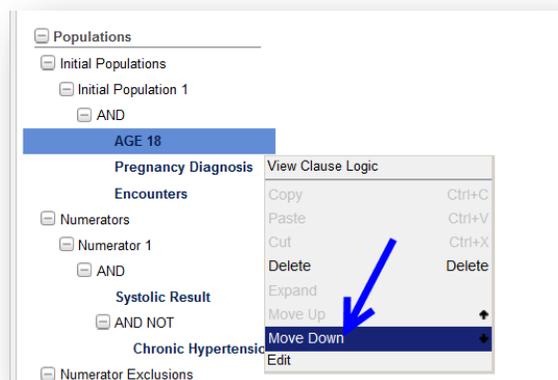
- 1) Right-click on the logical operator or clause name to be moved.

Figure 241 Clause to be Moved Selected (AGE 18)



- 2) Select 'Move Up' or 'Move Down' in the menu options depending on your desired action.

Figure 242 Right-click Menu - Clause (Move Down Selected)



Note: The 'Move Up' and 'Move Down' option is disabled if it is not an allowable action.

- 3) Once the measure logic is in the desired position, select the Save button.

Note: A segment of logic can be moved up more than one position, by repeating steps 1 and 2 until the logic is in the desired position.

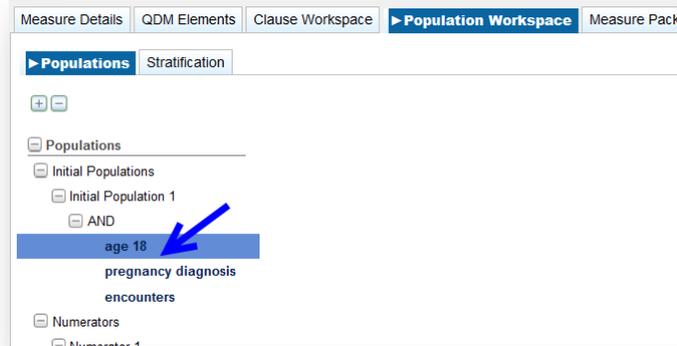
VI. ADD INLINE COMMENTS

Inline comments may be added to measure logic in the Population Workspace. Inline comments can be used to provide clarification about a logical clause used within a measure. Inline comments display in the human readable.

Instructions for adding an inline comment are provided below:

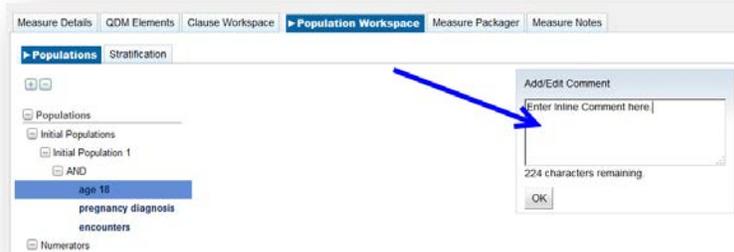
- 1) Enter Population Workspace and select the desired location for the inline comment to appear. An inline comment can be added to a logical operator or a clause.

Figure 243 Population Workspace - Clause Selected (Age 18)



- 2) Enter text into the 'Add/Edit Comment' box that is populated in the upper, right corner of the Population Workspace and select the OK button (gray).

Figure 244 Add/Edit Comment Text Box



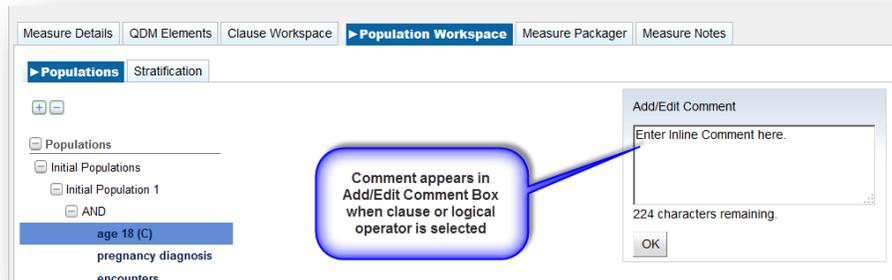
- 3) A '(C)' will appear to the right of the clause name or logical operator to which it was added.

Figure 245 Inline Comment Added



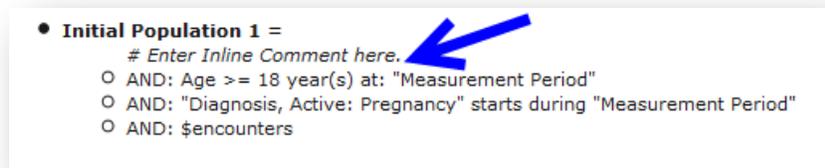
- 4) To view the comment, select the clause or logical operator, and the 'Add/Edit Comment' box appears in the upper, right corner of the Population Workspace.

Figure 246 Inline Text Displayed



- 5) Type in the desired text and select the OK button to place the comment.

Figure 247 Human Readable for Initial Population 1 with Inline Comment



- 6) Select the Save button prior to navigating from the Population Workspace.

Note: If a clause with an inline comment is replaced with another clause, the inline comment is retained. Please review the content of the inline comment, if applicable, to ensure accuracy when replacing an existing clause within Population Workspace.

VII. VIEW CLAUSE WORKSPACE LOGIC

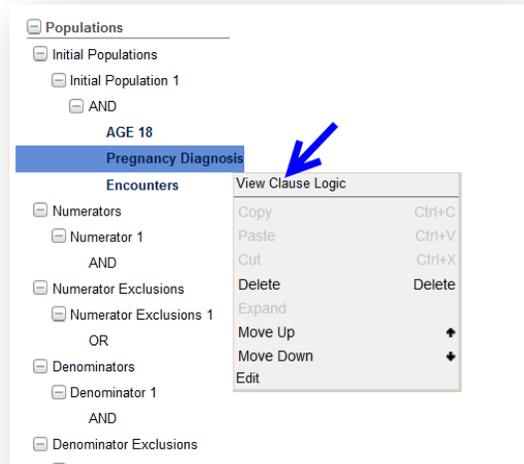
Population Workspace displays the clause name for the clause constructed with Clause Workspace. Users may view the clause logic of a specific clause within Population Workspace.

Note: Although clause logic for a specified clause can be viewed, it may only be edited within Clause Workspace.

Complete the following steps to view clause logic within Population Workspace:

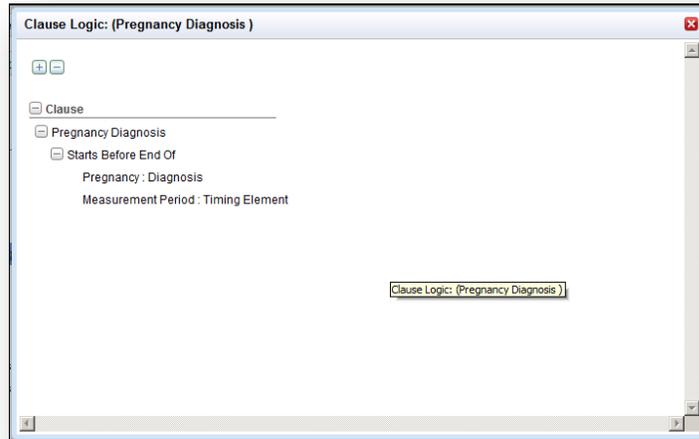
- 1) Right-click on the desired clause with the Population Workspace.
- 2) Select 'View Clause Logic' from the right-click menu.

Figure 248 View Clause Logic



3) View the clause logic displayed in the pop-up window.

Figure 249 Clause Workspace View of Clause Logic



4) Select the “X” (red) in the upper, right to close the window.

VIII. VIEW THE HUMAN READABLE FOR A SELECTED POPULATION

Within Population Workspace, users have the ability to view the human readable for a selected population, measure observation, or stratification. The measure logic as it appears in the human readable displays in a separate window.

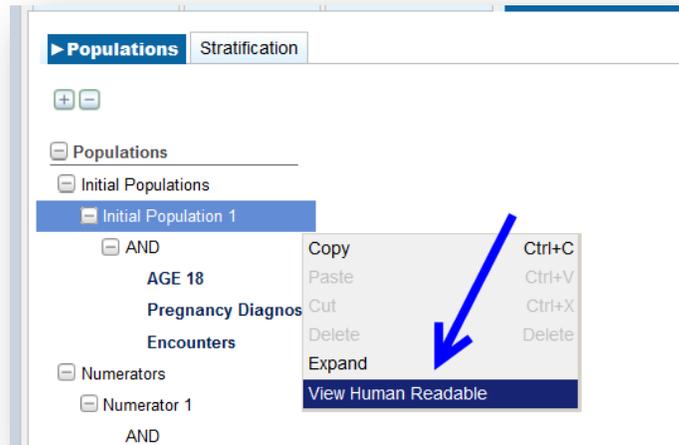
Note: If using Firefox as the internet browser, users may need to allow pop-ups to view the human readable.

Note: The measure logic must be valid to produce a view of the human readable. If there is invalid measure logic an error message will be produced, and the pop up window containing the view of the human readable will not be produced.

Complete the following steps to view the human readable for a selected population.

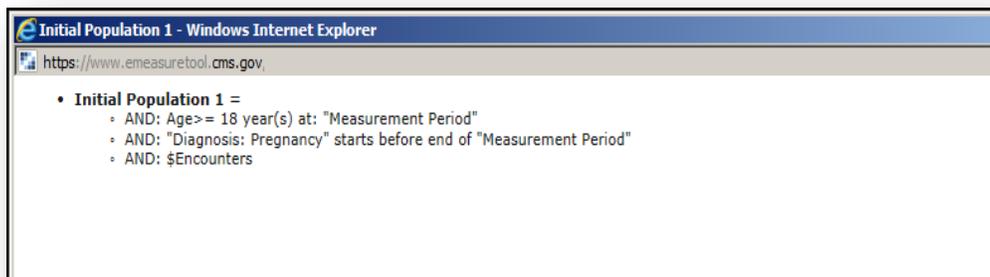
- 1) Within Population Workspace, right-click on the population name.
- 2) Select the 'View Human Readable' from the menu options.

Figure 250 Right-click Menu - View Human Readable Option Selected



- 3) The measure logic as it appears in the human readable displays in a separate window.

Figure 251 Human Readable for Initial Population 1



- 4) Close the window after viewing the contents of the selected population by selecting the "X" in the upper, right corner.

Note: Users may 'View the Human Readable' using the same steps in the Measure Observation and Stratification sub-tabs.

IX. MIGRATING EXISTING MEASURES

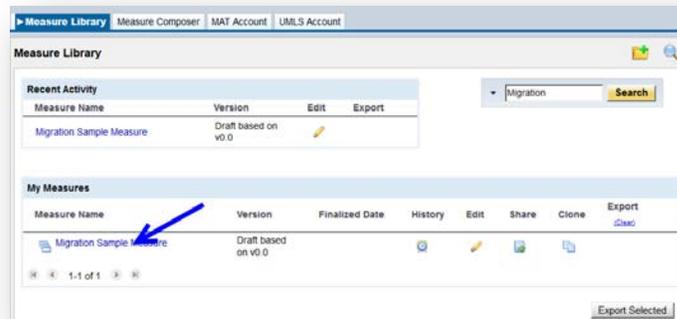
Measures added to the Measure Authoring Tool prior to the MAT version 4 release on July 25, 2014 need to be migrated to the new MAT version 4 format.

The Population Workspace contains existing measure logic. For a measure package in the MAT version 4 format to be successfully packaged the measure logic in the Population Workspace must be replaced with valid clauses constructed in the Clause Workspace. Instructions for building measure clauses in the Clause Workspace are located in [Chapter 9 Measure Composer-Clause Workspace](#). Once all the measure logic in the Population Workspace is replaced with clauses constructed in the Clause Workspace and are linked by logical operators AND, AND NOT, OR, or OR NOT, the measure can be packaged.

Note: Only the populations to be included in the measure package must be fully migrated. For example, if a measure package is to contain Initial Patient Population 1, Numerator 1, and Denominator 1, having invalid measure logic in Numerator Exclusions will not prevent the measure package from occurring.

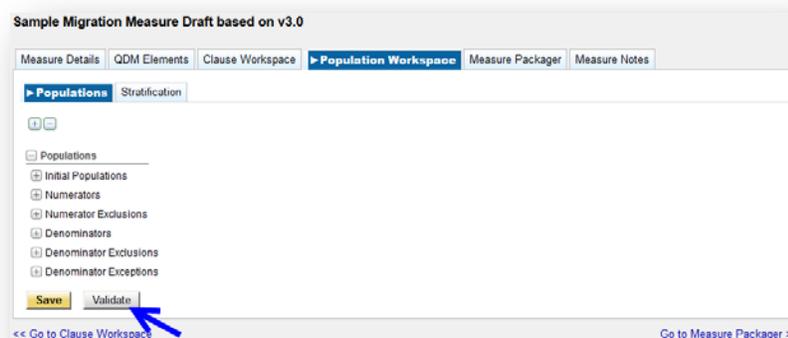
- 1) Select the measure to be migrated in the Measure Library by selecting the measure name.

Figure 252 Clause Library - Select Measure



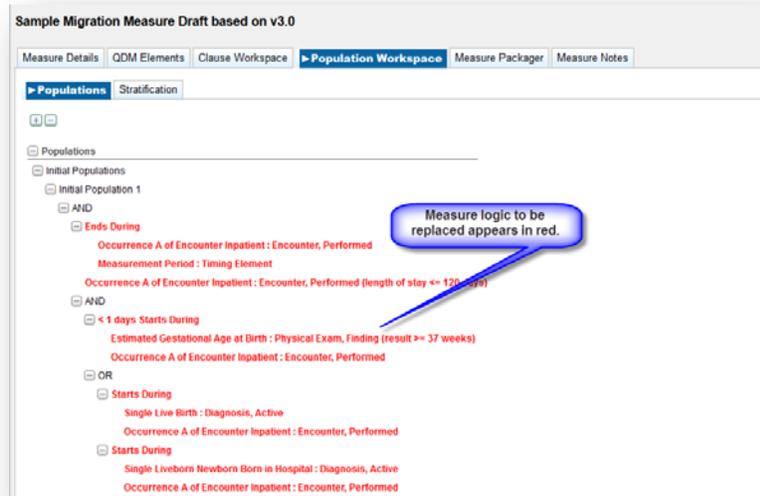
- 2) Access the Populations sub-tab in the Population Workspace and select the Validate button.

Figure 253 Population Workspace - Validate



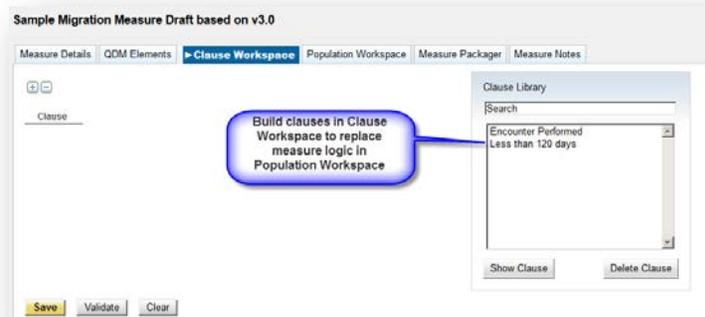
- 3) All measure logic which needs to be replaced appears in red.

Figure 254 Validation Complete - Invalid Logic in Red Text



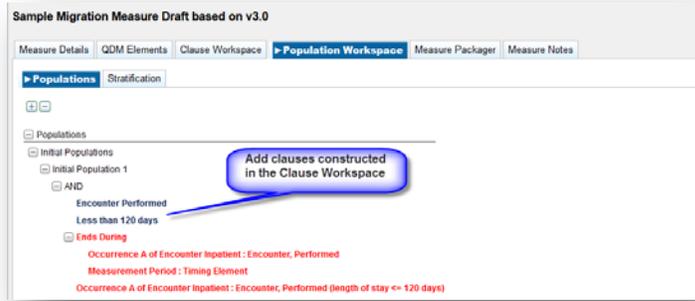
- 4) Review the measure logic highlighted in red, and reconstruct the clauses to reflect the [updated QDM](#).
- 5) Navigate to Clause Workspace and build each clause which comprises the measure logic within the Population Workspace. Instructions for building a clause in the Clause Library are found in the [Building a Measure Clause](#) section in this document.

Figure 255 Clause Workspace - Build Measure Clauses



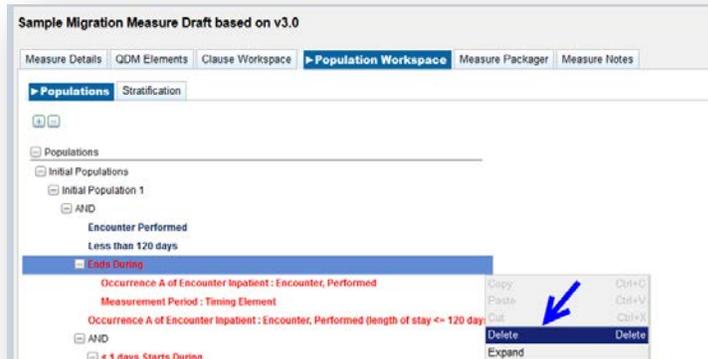
- 6) After the new clause(s) are constructed, return to the Population Workspace.
- 7) Add the clauses constructed in the Clause Workspace to Population Workspace using the logical operators AND, AND NOT, OR, and OR NOT to link and nest the clauses as desired.

Figure 256 Population Workspace - Add Newly Constructed Clauses



- 8) After the replacement clause(s) are added to the Population Workspace, delete the existing measure logic from Clause Workspace.

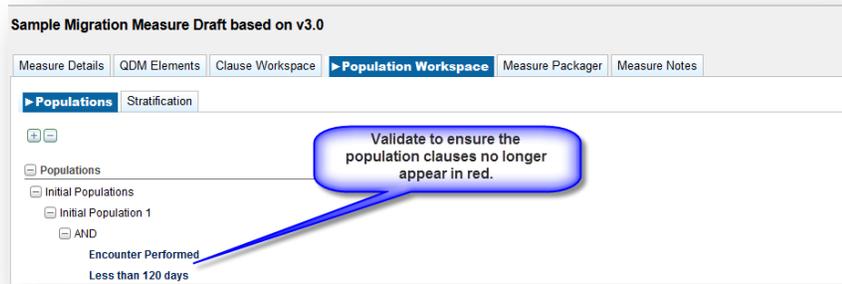
Figure 257 Population Workspace - Delete Invalid Measure Logic



Note: Once existing measure logic is deleted from the Population Workspace it cannot be recovered. It is best practice to add the replacement clause to the Population Workspace before deleting the invalid clause logic. Review the Validate Population Workspace section of this chapter for instructions on how to identify invalid measure logic in the Population Workspace.

- 9) Select the Validate button to ensure the populations intended for the measure package contain valid measure logic.

Figure 258 Population Workspace – Invalid Logic Removed



10) Select the Save button to retain changes.

Navigation Tip: After the measure populations are defined, users may advance to the Measure Details. For detailed instructions about packaging a measure advance to the next chapter, **Chapter 11: Measure Composer—Measure Packager**.

As a reminder, all Measure Details must be completed to export a valid HQMF measure.

[Chapter 7: Measure Composer-Measure Details](#) provides guidance to aid in the completion of all Measure Details fields.

Chapter 11: Measure Composer—Measure Packager

Chapter Overview: This chapter outlines how to create a measure package by creating measure groupings, adding an association or item count to a population, adding Supplemental Data Elements, adding Risk Adjustment Variables, and including VSAC value set data.

After a measure is named, QDM elements are added. Clauses are constructed in the **Clause Workspace** are added to the Population Workspace and linked using logical operators. If applicable, Stratification and/or Measure Observations are added and the measure is ready to be packaged and exported.

MAT users create one or more measure groupings in preparation for exporting the measure. Groupings are combinations of clauses included in a single measure package. The measure package is the culmination of all created groupings and ultimately includes the contents that can be exported. Grouping system clauses together for a measure allows the user to compile the system clauses in a meaningful way. Based on the type of measure scoring selected (proportion, ratio, continuous variable, or cohort), the user must observe the rules when creating groupings. Please refer to [Appendix C](#) for the measure grouping rules.

Note: For proportion measures, the numerator is a subset of the denominator. For ratio measures, the numerator is not a subset of the denominator, but rather a subset of the population.

Upon export of a proportion measure, the denominator in the human-readable version of the measure automatically includes “AND: Initial Patient Population.”

Upon export of a ratio measure, both the numerator and the denominator in the human-readable version of the measure automatically include “AND: Initial Patient Population.”

If the proportion measure is stratified by age and contains two populations (one for each age group), and one numerator and one denominator that apply to both populations, then the user would create two groupings as follows:

Grouping 1: Population 1, Denominator 1, Numerator 1

Grouping 2: Population 2, Denominator 1, Numerator 1

When the measure is packaged, all groupings for that measure are included in the measure package. Only measures with packages can be exported.

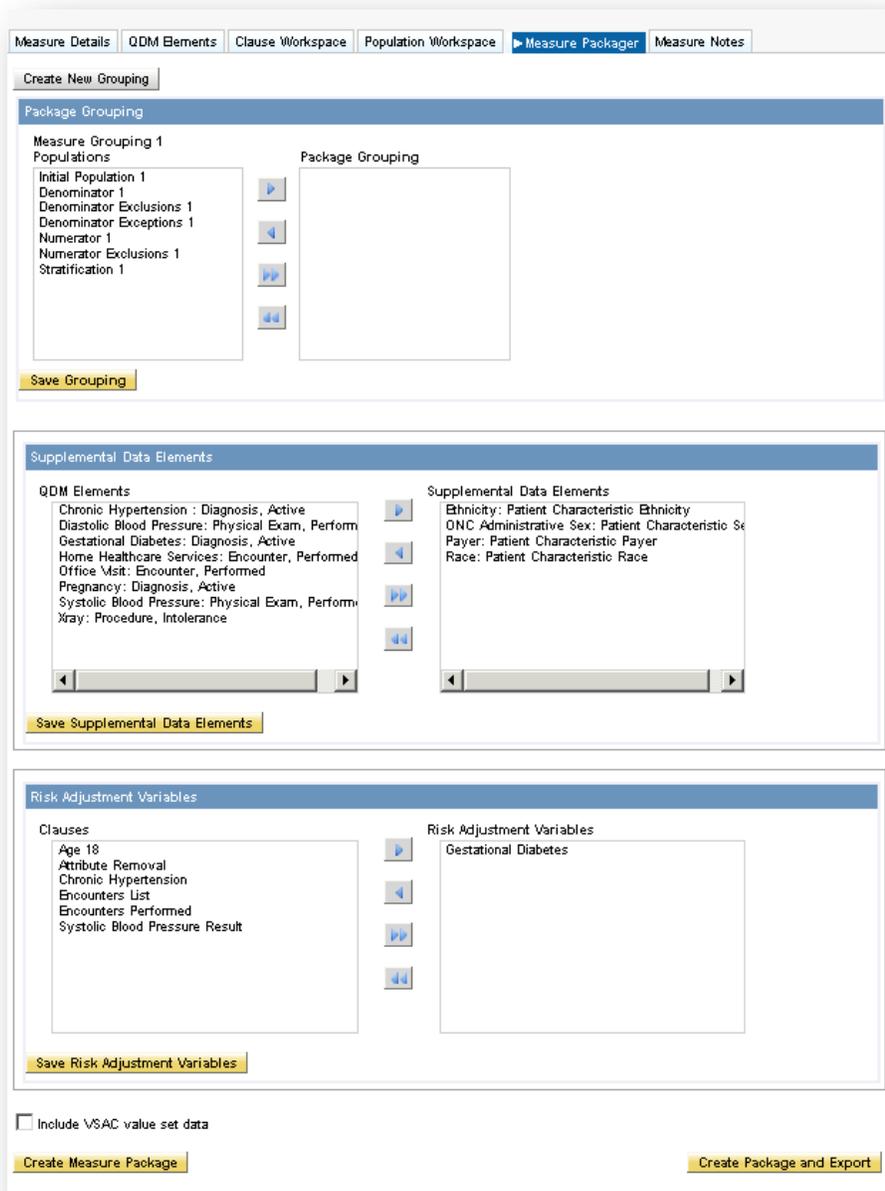
Note: If an empty population is added to a measure package, the empty population is included in the measure export.

On first access to the Measure Details tab, there are three banners (blue): Package Grouping, Supplemental Data Elements, and Risk Adjustment Variables.

Just above the Package Grouping banner is a Create New Grouping button (gray).

Below the banner are two fields: Measure Grouping 1 Populations and Package Grouping. Tools for transferring selected populations from the Measure Grouping 1 Population field over to the Package Grouping field and vice versa are positioned between the two fields. A Save Grouping button (yellow) is positioned just below these fields.

Figure 259 Measure Composer - Measure Packager



A field containing all applied QDM elements and a field containing Supplement Data Elements are below the blue Supplemental Data Elements banner. Four Supplemental Data Elements are populated by default. The tools to move QDM elements into and out of the Supplemental Data Elements field are found between QDM Elements and Supplemental Data Elements. There is a Save Supplemental Data Elements button (yellow) below these fields.

The Risk Adjustment Variables field allows MAT users to add clauses from the Clause Workspace to identify and define Risk Adjustment Variables for a given measure. A list of all clauses, with the exception of clauses identified as a QDM variable, display below the blue Risk Adjustment Variables banner.

Similar to the Supplemental Data Elements field, tools for moving clauses into and out of the Risk Adjustment Variables field are found between the list of available clauses and the Risk Adjustment Variables field. There is a Save Risk Adjustment Variables button (yellow) just below these fields.

A check box to include VSAC value set data sits just below the Save Risk Adjustment Variables button (yellow).

At the very bottom of the Measure Details are two export options: Create Measure Package or Create Package and Export.

To successfully prepare a measure package and export a measure in Measure Details the following steps must be completed:

- 1) Create one or more Measure Groupings (one or more measure groupings are permitted for all measure scoring types: proportion, ratio, continuous variable, and cohort.)
- 2) Select and save Supplemental Data Elements, if applicable.
- 3) Select and save Risk Adjustment Variables, if applicable.
- 4) Include VSAC value set data, if desired.
- 5) Select one of the two packaging options.

After a packaging option is selected, a validation is performed.

Note: [Appendix E](#) includes validation guidance to help MAT users resolve measure logic errors identified when a measure package is initiated.

The measure package is successful when:

- All clauses within the measure logic have the required LHS and RHS when using Timing, Relationship, and Satisfies functions.
- All clauses using Union, Intersection, or functions (i.e. Age At, Most Recent, Count) have at least one child node.

- Only QDM elements and attributes with valid OIDs and datatypes are used within the measure logic.
- The Population Workspace only contains clauses constructed in the Clause Workspace and logical operators AND, AND NOT, OR, or OR NOT.
- All QDM elements and attributes, clauses, populations, and grouping requirements pass validations as identified in [Appendix E](#).

The Measure Details also includes the ability to add an association for required populations when creating a measure grouping. An item count is added to a specific population using the item count option when creating a Measure Grouping, if applicable. Associations and Item Count are additions based on HQMF R2.

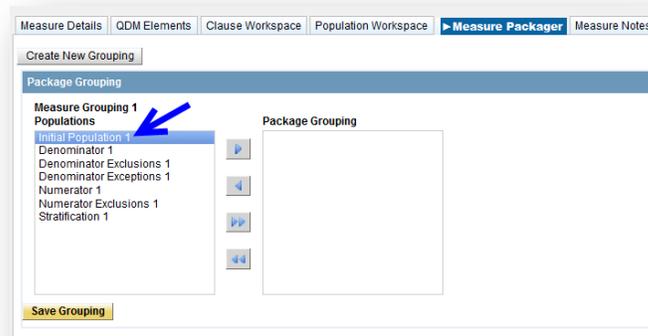
I. CREATE A MEASURE GROUPING

A Measure Grouping consists of the populations (i.e. Initial Population 1, Numerator 1, Denominator 1), Stratification, and Measure Observations that comprise the measure logic for the selected eMeasure.

When creating a measure grouping, users will be restricted from including populations in the package grouping not permitted for the measure scoring type. For example, only one Stratification is permitted per Package Grouping. An error message displays when attempting to move more than one Stratification into the Package Grouping, or a Package Grouping already contains more than one Stratification prior to the current version of the MAT.

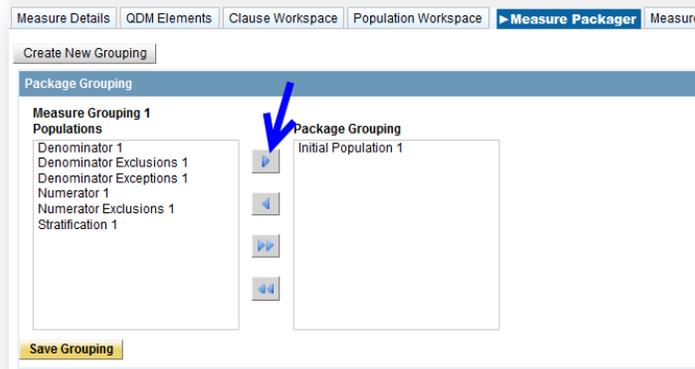
- 1) Select the desired population in the Populations box. The clause will be highlighted.

Figure 260 Measure Packager - Package Grouping



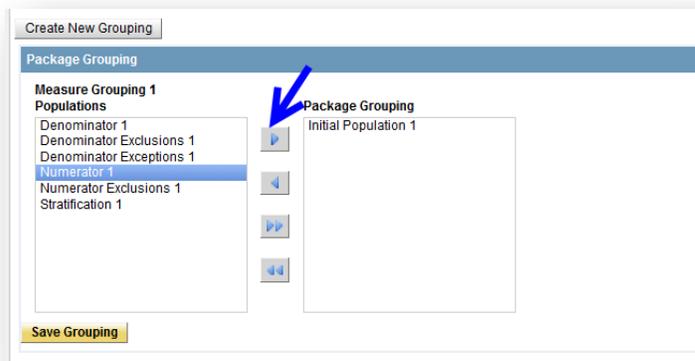
- 2) Select the right pointing arrow to move the population from Populations to Package Grouping.

Figure 261 Package Grouping - Add Initial Population 1



- 3) Select the next desired population in Populations and select the right pointing arrow to move it to Package Grouping.

Figure 262 Package Grouping - Adding Numerator 1

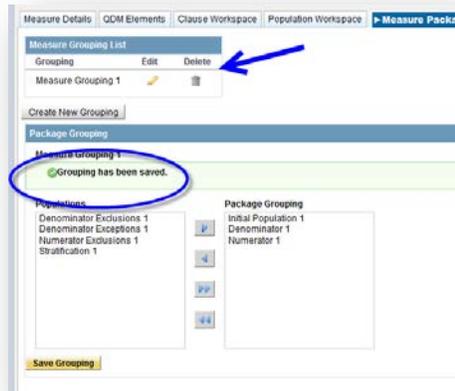


- 4) Continue moving desired populations from Populations to Package Grouping until all desired populations are transferred.
- 5) Select the Save Grouping button (yellow) located below Populations.

Note: When Save Grouping is selected in the Measure Package a validation of the Grouping selections is performed. [Appendix E](#) provides validation guidance for error messages received to aid MAT users in resolving the identified grouping error(s).

Once a measure grouping has been saved, the application remains on the same page and a success message displays. The Measure Grouping List displays at the top of the page, containing an entry for Measure Grouping 1.

Figure 263 Success Message - Measure Grouping Saved



Users can move clauses back and forth between the Populations and Package Grouping using both the left and right pointing arrows. Selecting the double left and double right arrows moves all populations at the same time between Populations and Package Grouping.

- 6) To create an additional grouping, select the Create New Grouping button. Measure Grouping 2 displays above Populations.
- 7) Repeat the steps outlined above to move clauses from the Populations to Package Grouping.
- 8) When all desired populations have been moved to the Package Grouping box, select the Save Grouping button (yellow). A success message displays if saved successfully. Measure Grouping 2 displays in the Measure Grouping List at the top of the page.
- 9) To view or edit a measure grouping, select the pencil icon next to the desired grouping. The clauses selected for that grouping display in Package Grouping.

Figure 264 Measure Grouping List – Edit (Pencil Icon)



- 10) To delete a measure grouping, select the delete icon next to the desired grouping. The grouping will be deleted from the Measure Grouping List.

Note: If changes are made to the measure once packaged (i.e. value set, measure phrase, system clause, or measure details changes), the user must create a new measure package to see those changes in the export files.

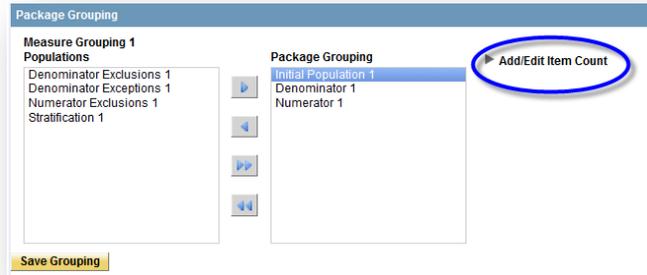
Navigation Tip: Upon completion of packaging a measure, the user must export the measure. Select [Export a Measure](#) to review step by step instructions.

A. Add Item Count

Item count is added to a specific population when creating a package grouping. HQMF R2 introduced the concept of Item Count. This section describes how to use the tool to add an Item Count for a specific population to be included in the measure package.

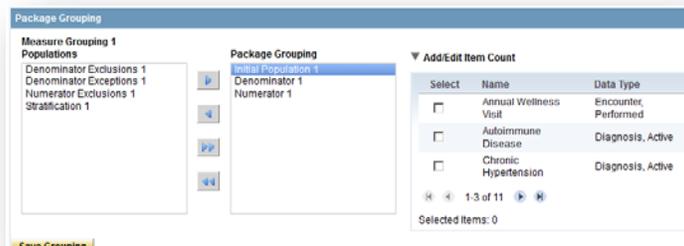
1. Select the name of the population in Package Grouping. 'Add/Edit Item Count' appears to the right of Package Grouping.

Figure 265 Package Grouping - Add/Edit Item Count



2. Select 'Add/Edit Item Count' and observe a list of the applied QDM elements. A pagination tool is located at the bottom of the list to scroll through the available QDM elements.

Figure 266 Package Grouping - Add/Edit Item Count



3. Select the checkbox next to the desired QDM element(s) to be used for the Item Count(s).
4. An Item Count can be removed by deselecting the checkbox next to the QDM element.
5. Select the Save Grouping button (yellow) to save the Item Count selections in the grouping.

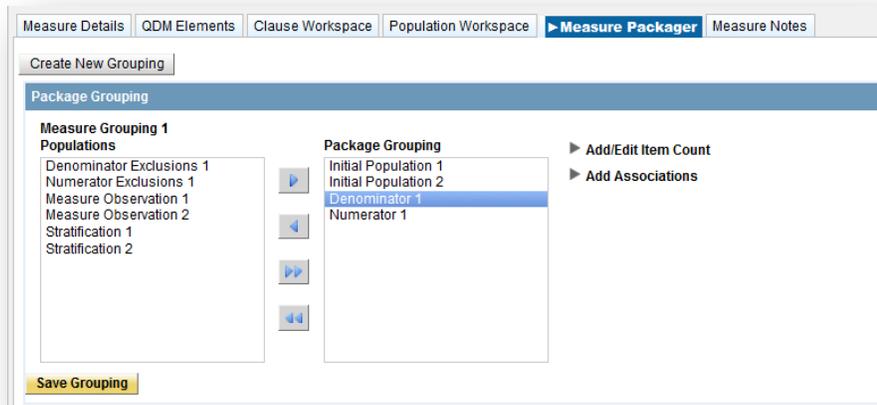
Note: Item Count selections appear to the right of the population name in parentheses in the Population Criteria section of the human readable.

B. Designate an Association

The ability to apply an association to a population is added when creating a package grouping. HQMF R2 introduced the concept of Association. It is used to associate initial populations to the numerator or denominator when more than one initial population is included in a grouping for a ratio measure. Associations can also be applied to Measure Observations. This section describes how to use the tool to add an association. When more than one initial population is added to the package grouping for ratio measures, the measure package will fail if the numerator and denominator are not associated to the initial populations.

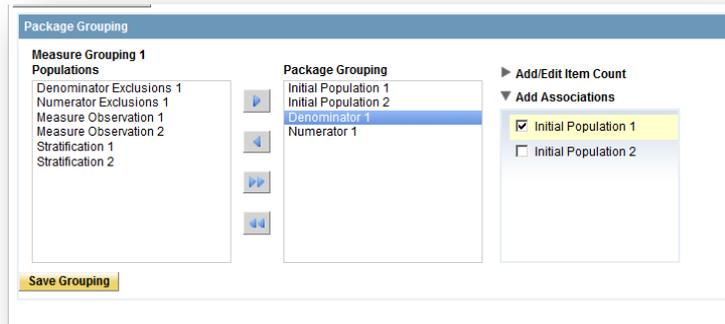
1. Navigate to a Measure Details for a Ratio or Continuous Variable Measure. (This example uses a Ratio measure.)
2. Create a Package Grouping by adding more than one Initial Population, including more than one Initial Population.
3. Select the Denominator in Package Grouping. 'Add Associations' appears below 'Add/Edit Item Count' to the right of Package Grouping.

Figure 267 Package Grouping - Add Association



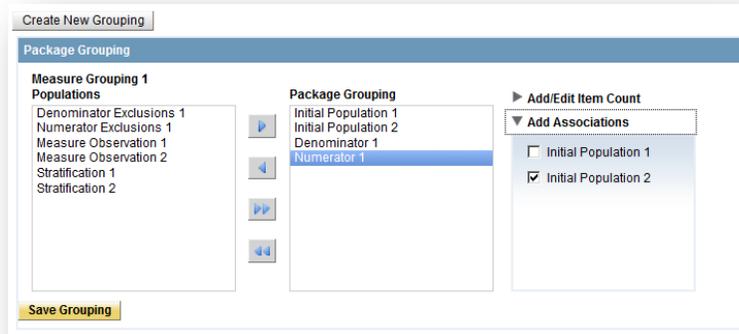
4. Select 'Add Associations'. Initial Population 1 and Initial Population 2 with a checkbox to the left appear in a box just below 'Add Associations'.
5. Select the checkbox that corresponds with the population to associate with the Denominator. In this example, Denominator 1 is associated with Initial Population 1.

Figure 268 Add Association - Initial Population 1 Checkbox Selected



6. Select the Numerator 1 in Package Grouping and select 'Add Associations'. The checkbox for Initial Population 2 is selected by default since Initial Population 1 is already associated to Denominator 1.

Figure 269 Add Association - Initial Population 2 Checkbox Selected



7. Now that associations are made, select Save Grouping. If associations are not designated in ratio measures when more than one Initial Population is added to the Package Grouping, the measure grouping fails and an error message displays.

II. SELECT SUPPLEMENTAL DATA ELEMENTS

Supplemental data elements are those that should be identified for each patient for whom the measure is applicable. Such additional data can be used to evaluate for disparities in care or to risk adjust with the data listed in this section.

The CMS defines four supplemental data elements for each measure (payer, ethnicity, race and ONC Administrative Sex). The supplemental data elements are available in the MAT and are listed below:

Patient Characteristic Sex: ONC Administrative Sex using ONC Administrative Sex Value Set (2.16.840.1.113762.1.4.1)

Patient Characteristic Race: Race using Race CDC Value Set (2.16.840.1.114222.4.11.836)

Patient Characteristic Ethnicity: Ethnicity using Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)

Patient Characteristic Payer: Payer using Payer Source of Payment Typology Value Set (2.16.840.1.114222.4.11.3591)

Users may select QDM elements that have been applied to the eMeasure as supplemental data elements. The four CMS required supplemental data elements (payer, ethnicity, race, and ONC Administrative Sex), are selected by default in the ‘Supplemental Data Elements’ section, but can be deselected if the user prefers this option.

To select elements as supplemental data elements:

- 1) Select the desired QDM element in the ‘QDM Elements’ box. The QDM element will be highlighted.
- 2) Select the right pointing arrow to move the QDM element from the ‘QDM Elements’ box to the ‘Supplemental Data Elements’ box. Continue moving QDM elements from the ‘QDM Elements’ box to the ‘Supplemental Data Elements’ box until all desired QDM elements have been transferred to the ‘Supplemental Data Elements’ box. Note: Users can move elements back and forth between the ‘QDM Elements’ box and the ‘Supplemental Data Elements’ box using both the left and right pointing arrows. Selecting the double left and double right arrows will move all elements at the same time between the QDM Elements box and the ‘Supplemental Data Elements’ box.
- 3) Select the Save Supplemental Data Elements button (yellow) once the desired supplement data elements appear in the list box.
- 4) A success message will display when the supplemental data elements have been saved.

If no supplemental data elements are selected in the Measure Details tab, the word ‘None’ displays in the ‘Supplemental Data Element’ section in the body of the human readable eMeasure.

Once the user has created one or more measure groupings and has selected the desired supplemental data elements and are ready to package the measure, they must determine whether or not to include VSAC value set data in the measure package.

Note: The HTML human readable displays selected Supplemental Data Elements in the section titled ‘Supplemental Data Elements’.

III. ADD RISK ADJUSTMENT VARIABLES

Within the Measure Details, MAT users have the option to add clauses to define Risk Adjustment Variables for the selected measure. Clauses built in the Clause Workspace, which are not designated as QDM variables, may be added to the Risk Adjustment Variables list. The clauses select specifically identify criteria which may impact the measure results negatively, and are not related to the quality of care being provided.

Instructions for adding Risk Adjustment Variables are provided next.

- 1) Select the desired clause from the clause list. The clause is highlighted.
- 2) Select the right pointing arrow to move a clause from the list of clauses to the 'Risk Adjustment Variables' list. Continue moving clauses from the list of clauses to the 'Risk Adjustment Variables' list until all desired clauses are transferred to the 'Risk Adjustment Variables' list. Users can move elements back and forth between the clause list and the 'Risk Adjustment Variables' list using both the left and right pointing arrows. Selecting the double left and double right arrows moves all elements at the same time between the clause list and the 'Risk Adjustment Variables' list.
- 3) Select the Save Risk Adjustment Variables button (yellow) once the desired clauses appear in the list box.
- 4) A success message displays when the clauses are saved.

Note: The HTML human readable displays the selected clauses in the section titled 'Risk Adjustment Variables'.

IV. INCLUDE THE VSAC VALUE SET DATA

Once one or more measure groupings is created and the user is ready to package the measure, they must first determine if they would like to include VSAC value set data or would like to package the measure without VSAC value set data. Both methods of packaging the measure will result in an eMeasure (human readable) and Simple XML included in the export.

A. Packaging without VSAC value set data

An active connection to the VSAC is not required to package a measure without VSAC value set data. This method of packaging a measure is desirable in situations where there is an expected or unexpected interruption in the connection to the VSAC or to allow a measure developer to review measure logic quickly and efficiently. When packaging a measure without VSAC value set data, the measure output will include an empty value set Excel spreadsheet, user defined QDM elements (if applicable), and the version of value set used in the selected measure used at the time of QDM creation or after the most recent successful manual update from the VSAC in Applied Elements.

B. Packaging with VSAC value set data

An active connection to the VSAC is required to package a measure with VSAC value set data. This method of packaging a measure is required for measure packages being created for publishing, reporting, and reviewing the value set data (value set Excel spreadsheet) included in the measure. When packaging a measure with VSAC value set data, the measure output includes a value set Excel spreadsheet with all VSAC value sets, user defined QDM elements (if applicable), the most recent versions of the value sets used in the selected measure, unless a

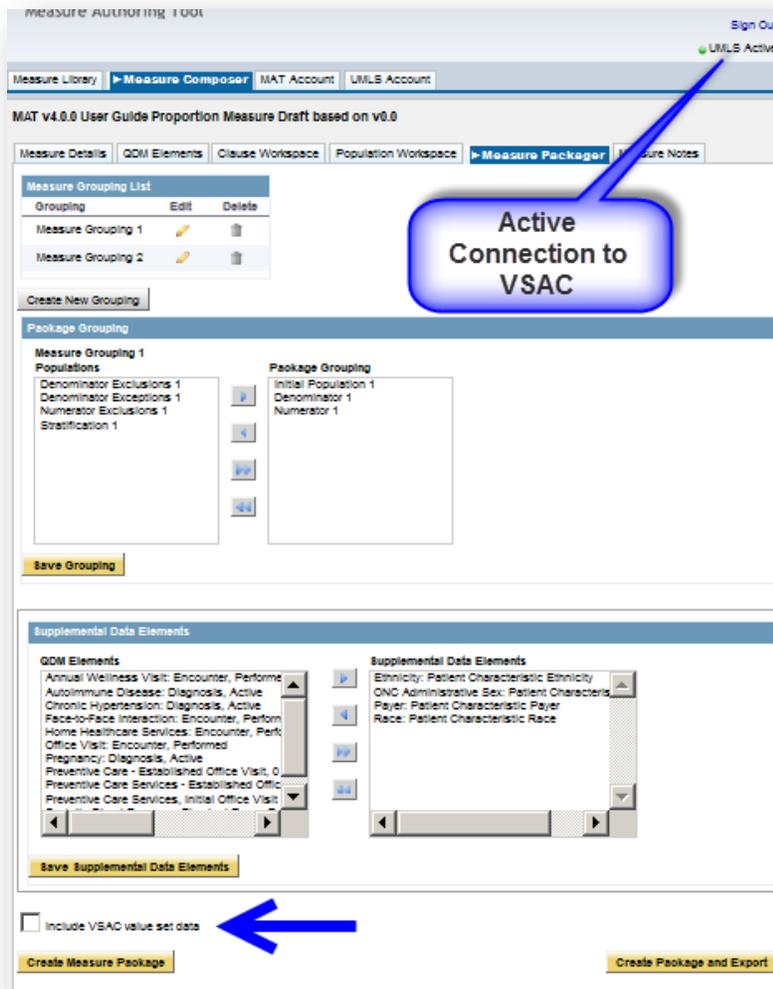
version or effective date was specified, and, the most recent updates made to the VSAC value sets used in the measure when the measure package was created.

The measure package includes the most recent version of all value sets used within the measure logic unless a version or effective date of a value set was specified at the time of QDM creation.

C. Instructions for packaging with VSAC value set data are as follows:

1. Confirm an active connection to the VSAC by observing the dot (green) with the text 'UMLS Active' in the upper, right corner of the page. (This is not required if packaging without VSAC value set data).
2. After the desired measure grouping is created, select the check box located on the bottom, left corner of the page titled 'Include VSAC value set data'. The checkbox is located just above the Create Measure Package button (yellow).

Figure 270 Measure Packager - Active VSAC Connection Confirmed



3. Once the measure grouping is created, the desired supplemental data elements are selected and the 'Include VSAC value set data' checkbox is selected, select the Create Measure Package button.

Note: It is not a requirement to include VSAC value set data. However, **the 'Include VSAC value set data' checkbox must be selected for the most recent VSAC value set data to be included in the measure export.** Additional loading time may be observed as data is retrieved from the VSAC.

4. Including VSAC value set data in the measure package may result in an increased loading time. A 'loading please wait' message displays at the bottom of the page while the measure package is loading.
5. A success message is populated when the measure has been packaged successfully.

V. PACKAGING OPTIONS

To successfully prepare a measure package and export a measure in Measure Details the following steps must be completed:

- 1) Create one or more Measure Groupings.
- 2) Add and save Supplemental Data Elements, if applicable.
- 3) Add and save Risk Adjustment Variables, if applicable.
- 4) Include VSAC value set data, if desired.
- 5) Select one of the two packaging options.

Two packaging options are available: Create Measure Package or Create Package and Export.

Figure 271 Export Options



A. Selecting Create Measure Package:

1. A success or error message is generated and displayed in a green ribbon on the Measure Details page.
2. The MAT user must then navigate to the Measure Library and select the Export icon (yellow) for the measure.
3. The user has the option to select which format to export, the human readable, the Simple XML, the value set Excel spreadsheet, or a measure package which produces a zip file

containing the Simple XML, HTML human readable, value set Excel spreadsheet, and the HQMF R2.1 XML file.

B. By selecting Create Package and Export:

1. An error message displays if the package attempt fails.
2. If successful, the measure package is automatically generated in a zip file containing the Simple XML, HTML human readable, value set Excel spreadsheet, and the HQMF R2.1 XML file.

Chapter 12: Measure Composer—Measure Notes

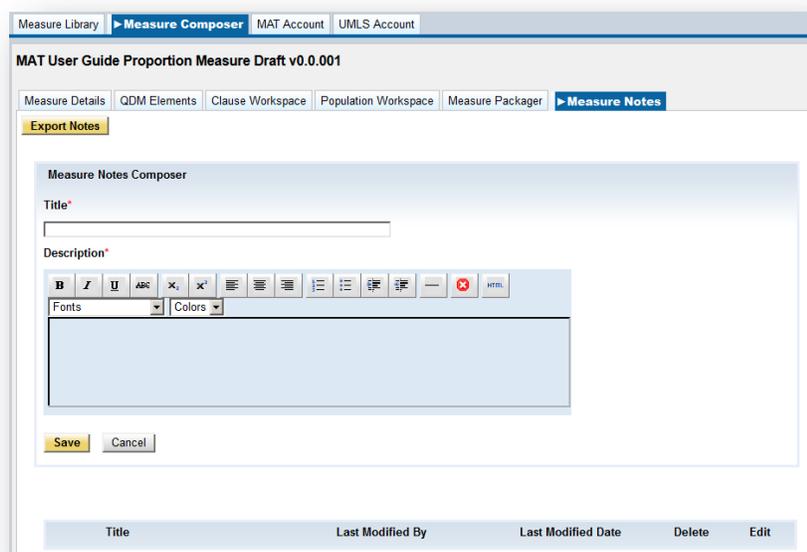
Chapter Overview: This chapter describes the Measure Notes tab features in Measure Composer. A measure note enables the measure developer(s) to make comments pertaining to a particular measure. Measure notes are not a component of the measure package, but can be exported, if desired, and serve as an artifact for a measure.

I. CREATING A MEASURE NOTE

The Measure Notes tab of Measure Composer gives MAT users the opportunity to write and save comments within a specified draft or version of a measure. The comments are not part of the measure export; however, MAT users are given the option to export measure notes to a HTML file.

When entering the Measure Notes tab, an Export button (yellow) is located in the top, left corner. Just below the Export button is a text field which allows a MAT user to input a descriptive title for the measure note. The 'Description' text field is positioned directly below the title and allows the MAT user to insert comments. The Save button and Cancel button are located just below the measure note. Previous measure notes will be populated below the measure note composer. The list will include the measure note title, email address of the note creator or the last user to modify the note, the last modified date, a delete icon, and an edit icon.

Figure 272 Measure Composer - Measure Notes



Measure notes may be added to a measure draft or version within the MAT. MAT users may choose to use this functionality to communicate information about a specific measure. All MAT users will be able to view measure notes unless the measure draft or version has been designated as 'Private'. For measures that have been designated as 'Private', only the measure owner and users who have been provided 'Modify' access to the measure will be able to view the measure notes. The MAT owner and users with 'Modify' access are permitted to add comments on the Measure Notes page.

Note: Measure notes are included in a draft of a measure; however, measure notes are not included in a cloned measure.

MAT users are given the opportunity to title each entry and include up to 3000 characters per measure note. The content of the measure note is determined by the MAT user. Measure notes are not required. Use of the Measure Notes page is at the discretion of each individual user and/or their organization.

Detailed instructions for composing, editing, deleting, and exporting measure notes are provided in the next sections of this chapter.

A. Composing a Measure Note

The following instructions guide MAT users who wish to compose a Measure Note for a measure draft or version.

1. Select the desired measure by selecting the measure name in the Measure Library. User will automatically be navigated to the Measure Composer tab.
2. Select the Measure Notes tab within Measure Composer.
3. Type a measure note title in the 'Title' text field of the Measure Notes Composer.

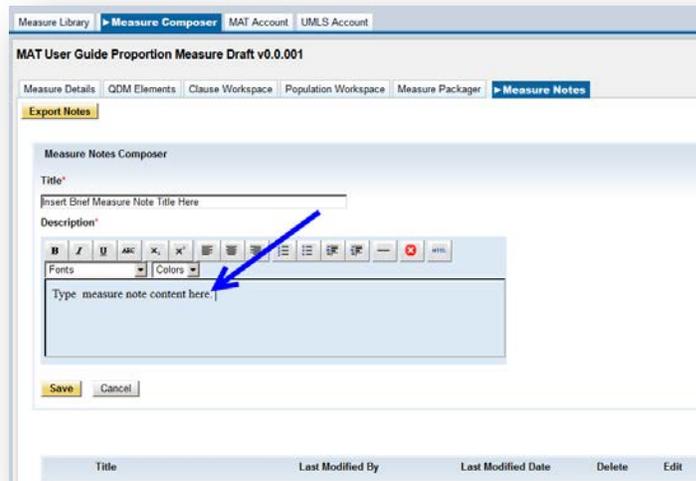
Figure 273 Measure Notes - Note Title

The screenshot shows the 'Measure Notes Composer' window. At the top, there are tabs for 'Measure Details', 'QDM Elements', 'Clause Workspace', 'Population Workspace', 'Measure Packager', and 'Measure Notes'. Below the tabs is an 'Export Notes' button. The main area is titled 'Measure Notes Composer' and contains a 'Title*' field with the placeholder text 'Insert Brief Measure Note Title Here'. A blue arrow points to this field. Below the title field is a 'Description*' field with a rich text editor toolbar. At the bottom of the composer are 'Save' and 'Cancel' buttons. Below the composer is a table with columns for 'Title', 'Last Modified By', 'Last Modified Date', 'Delete', and 'Edit'.

Note: An asterisk (red) indicates required fields.

4. Type the content of the measure note in the 'Description' text field.

Figure 274 Measure Notes - Note Description



Note: A toolbar is available to provide alternative formatting options for the measure note such as creating bold or italicized text.

5. Select the Save button to save the measure note. Users receive a message confirming the note is saved successfully in a ribbon (green background) at the top of the page.

After the measure note is saved successfully, the measure note title, email of the user who last modified the measure note, the date and time stamp of the most recent modification will be displayed below the Measure Note Composer.

Once a measure note is created, it can be deleted, modified, or exported. The next sections of this chapter will provide details regarding these additional functions.

B. Editing Measure Note

Measure owners or MAT users with 'Modify' access to a measure may edit existing measure notes. Detailed instructions for editing measure notes are provided below.

1. To edit an existing measure note, identify the measure note to be edited.
2. Click on the 'Edit' icon positioned in the last column for the selected measure note to be modified.

Figure 275 Measure Notes - Notes List

Title	Last Modified By	Last Modified Date	Delete	Edit
Insert Brief Measure Note Title Here	[REDACTED]	09/17/2014 12:43:35 PM CDT		

3. A new 'Title' and 'Description' text box will open for the measure note. Type the changes to the measure note 'Title' or 'Description' as desired.

Figure 276 Measure Notes - Edit Existing Measure Note

Title	Last Modified By	Last Modified Date	Delete	Edit
Insert Brief Measure Note Title Here	[REDACTED]	09/17/2014 12:43:35 PM CDT		

Title*

Insert Brief Measure Note Title Here

Description*



Fonts: [Dropdown] Colors: [Dropdown]

Type measure note content here.

4. Select the Save button to save modifications to the measure note. The 'Last Modified By' and 'Last Modified Date' fields will be updated after the measure note change is saved.
5. A message will display after the edited measure note has been saved successfully.

II. DELETING A MEASURE NOTE

Measure notes can be removed from the MAT at the discretion of the MAT user. Step by step instructions are provided below if a MAT user desires to remove a measure note from a specific measure draft or version.

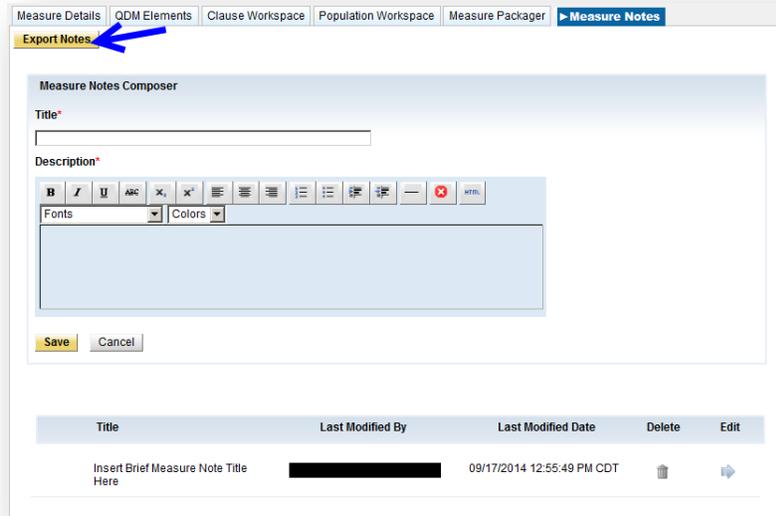
- 1) In the Measure Notes tab, identify the measure note 'Title' to be removed.
- 2) Select the 'Delete' icon in the same row as the measure note title.
- 3) The measure note will be permanently deleted and will no longer display in the list of measure notes.

III. EXPORTING A MEASURE NOTE

MAT users may export the measure notes contained within the MAT. The measure notes are exported as an HTML file. The instructions to produce an export of the measure notes are described below.

- 1) In the Measure Library, select the measure draft or version for which you would like to export the notes. (Only notes for one measure draft or version may be exported at a time.)
- 2) Select the Measure Notes tab of Measure Composer.
- 3) In the Measure Notes tab, select the Export Notes button in the upper, left corner of the page, below the tab headings.

Figure 277 Measure Notes - Export Notes



- 4) You are given the option to 'Open' or 'Save' the measure notes for the selected measure. The notes are exported as a Microsoft Office Excel Comma Separated Values File (CSV file).
- 5) 'Save' or 'Open' the exported HTML file, as desired.

Note: In earlier versions of the MAT, prior to the introduction of the Measure Notes page, MAT users entered 'User Comments' within the Measure History, accessible from the Measure Library. User comments are notes the MAT user entered manually into the Measure History. 'User Comments' added to the measure history page are now relocated to the Measure Notes page within the MAT. These entries will appear with the title 'User Comments' within Measure Notes. Users may rename comment(s) to something more descriptive, if desired, using the 'Edit' feature available within the Measure Notes page.

Glossary

Term	Definition
Attribute	A constraint on a QDM element that further defines the requirements for the measure logic and provides specific detail about a QDM element. The available attributes are based on the category and datatype of the QDM element.
Category	A single clinical concept identified by a value set and is the highest level of definition for a QDM element. (i.e. Medication, Procedure, Condition/Diagnosis/Problem, Communication, Encounter, etc...)
Clinical Recommendation Statement	Summary of relevant clinical guidelines or other clinical recommendations supporting an eMeasure.
Clone	The ability to copy a clause and modify, add to, or delete any part of it. Once a clause is cloned it becomes a new clause and loses all reference to the original clause.
Cohort Measure Score	A measure score in which a population is identified from the population of all items being counted. For example, one can identify all the patients who have had H1N1 symptoms. This population is very similar to the Initial Population but is called a Cohort Population for public health purposes.
Continuous Variable Measure Score	A measure score in which each individual value for the measure can fall anywhere along a continuous scale (e.g., mean time to thrombolytics which aggregates the time in minutes from a case presenting with chest pain to the time of administration of thrombolytics).
Copyright	Identifies the organization(s) who own the intellectual property represented by the eMeasure.
Datatype	The context in which each category is used to describe a part of the clinical care process (i.e. Encounter, Performed; Diagnosis; Medication, Ordered, etc...).

Term	Definition
Denominator	<p>The denominator can be the same as the initial patient population or a subset of the initial patient population to further constrain the population for the purpose of the eMeasure. Different measures within a set may have the same initial patient population but different denominators. Continuous Variable measures do not have a Denominator, but instead define a Measure Population.</p> <p>For proportion or ratio measures, the verbiage “Equals Initial Population” with no additional criteria indicates the denominator is identical to the initial patient population. It can be the same as the initial population or a subset of the initial population to further constrain the population for the purpose of the eMeasure. Different measures within an eMeasure set may have different Denominators. Continuous Variable eMeasures do not have a Denominator, but instead define a Measure Population.</p>
Denominator Exceptions	<p>Denominator exceptions are those conditions that should remove a patient, procedure or unit of measurement from the denominator only if the numerator criteria are not met. Denominator exceptions allow for adjustment of the calculated score for those providers with higher risk populations. Denominator exceptions are used only in proportion eMeasures. They are not appropriate for ratio or continuous variable eMeasures.</p> <p>Denominator exceptions allow for the exercise of clinical judgment and should be specifically defined where capturing the information in a structured manner that fits the clinical workflow. Generic denominator exception reasons used in proportion eMeasures fall into three general categories: medical reasons, patients’ reasons, and system reasons.</p>
Denominator Exclusions	<p>Patients who should be removed from the eMeasure population and denominator before determining if numerator criteria are met. Denominator exclusions are used in proportion and ratio measures to help narrow the denominator.</p>
Description	<p>A general description of the eMeasure intent.</p>
Disclaimer	<p>Disclaimer information for the eMeasure.</p>
eMeasure Identifier	<p>Represents the globally unique measure identifier for a particular quality eMeasure.</p>

Term	Definition
eMeasure Title	The title of the quality eMeasure.
eMeasure Version Number	A major version number, a minor version number, and a revision number separated by decimals used to indicate the version of the eMeasure in the format of v0.0.0
Endorsed By	The organization that has endorsed the eMeasure through a consensus-based process.
Export	Export allows the user to export the eMeasure artifact files that include the HQMF XML eMeasure, HTML human-readable document, as well as an Excel document with the value sets for a measure.
Function	<p>A qualifier for a QDM element.</p> <p>Example:</p> <p>FIRST [Diagnosis] COUNT [ICU Encounter]</p> <p>FIRST and COUNT are the functions in these statement. Refer to the most recent Quality Data Model for additional information about Functions.</p>
Grouped Value Set	Two or more value sets that share the same category and that are grouped together by the user into a parent value set.
Grouping	Groupings are combinations of system clauses that can be included in a single measure package.
Guidance	Used to allow measure developers to provide additional guidance for implementers to understand greater specificity than could be provided in the logic for data criteria.
HQMF	Health Quality Measures Format.
Improvement Notation	Information on whether an increase or decrease in score is the preferred result (e.g., a higher score indicates better quality or a lower score indicates better quality or quality is within a range).

Term	Definition
Initial Population	<p>All entities to be evaluated by an eMeasure which may but are not required to share a common set of specified characteristics within a named measurement set to which the eMeasure belongs.</p> <p>This initial population is present regardless of the measure scoring type; i.e., proportion, ratio, cohort and continuous variable measures all have an initial population section. Details often include information based upon specific age groups, diagnoses, diagnostic and procedure codes, and enrollment periods.</p>
Measure Developer	The organization that developed the eMeasure.
Measure Observations	Measure observations are used only in continuous variable and ratio eMeasures. They provide the description of how to evaluate performance, (e.g., the mean time across all Emergency Department visits during the measurement period from arrival to departure). Measure observations are generally described using a statistical methodology such as: count, etc.
Measure Package	The measure information needed to export a measure, which includes the measure details, value sets, logic, and groupings.
Measurement Period	The time period for which the eMeasure applies.
Measure Phrase	One or more QDM elements, attributes, and the corresponding syntax that are combined together to represent a logical statement.
Measure Population	Measure population is used only in continuous variable eMeasures. It is a narrative description of the eMeasure population. (e.g., all patients seen in the Emergency Department during the measurement period).
Measure Scoring	Indicates how the calculation is performed for the eMeasure (e.g., proportion, continuous variable, ratio, cohort)
Measure Steward	The organization responsible for the continued maintenance of the eMeasure.
Measure Type	Indicates whether the eMeasure is used to examine a process or an outcome over time (e.g., Structure, Process, Outcome).

Term	Definition
Numerator	Numerators are used in proportion and ratio eMeasures. In proportion measures the numerator criteria are the processes or outcomes expected for each patient, procedure, or other unit of measurement defined in the denominator. In ratio measures the numerator is related, but not directly derived from the denominator (e.g., a numerator listing the number of central line blood stream infections and a denominator indicating the days per thousand of central line usage in a specific time period).
Numerator Exclusions	Numerator Exclusions are used only in ratio eMeasures to define instances that should not be included in the numerator data. (e.g., if the number of central line blood stream infections per 1000 catheter days were to exclude infections with a specific bacterium, that bacterium would be listed as a numerator exclusion.)
NQF Number	Specifies the NQF number.
OID	Object Identifier—Used to uniquely identify the components of an eMeasure. The OID for each user within the Personal Information sub-tab should represent the registered OID for the organization with which that person is affiliated.
Proportion Measure Score	The population types for a Proportion measure are "Initial Population", "Denominator", "Denominator Exclusion", "Numerator", "Numerator Exclusion" and "Denominator Exception".
QDM	Quality Data Model.
Rate Aggregation	Describes how to combine information calculated based on logic in each of several populations into one summarized result. It can also be used to describe how to risk-adjust the data based on supplemental data elements described in the eMeasure. (e.g., pneumonia hospital measures antibiotic selection in the ICU versus non-ICU and then the roll-up of the two).
Ratio Measure Score	A score that may have a value of zero or greater that is derived by dividing a count of one type of data by a count of another type of data (e.g., the number of patients with central lines who develop infection divided by the number of central line days).
Rationale	Succinct statement of the need for the measure. Usually includes statements pertaining to Importance criterion: impact, gap in care and evidence.

Term	Definition
Reference(s)	Identifies bibliographic citations or references to clinical practice guidelines, sources of evidence, or other relevant materials supporting the intent and rationale of the eMeasure.
Relative Timing	Conditions that describe timing relationships among individual QDM elements to represent a logical statement.
Risk Adjustment	The method of adjusting for clinical severity and conditions present at the start of care that can influence patient outcomes for making valid comparisons of outcome measures across providers. Indicates whether an eMeasure is subject to the statistical process for reducing, removing, or clarifying the influences of confounding factors to allow more useful comparisons.
Root OID	The root OID within the Personal Information sub-tab should represent the registered OID for the organization with which the user is affiliated with an extension to designate the work created in the MAT. The root OID provided will be consumed by the tool to create the value set OIDs.
Share	Sharing allows an owner of a measure to share it with another user in a Modify mode. The user who has the measure shared with them will have the ability to modify the measure.
Stratification	Describes the strata for which the measure is to be evaluated. There are three recognized reasons for stratification based on existing work. These include: (1) evaluate the measure based on different age groupings within the population described in the measure (e.g., evaluate the whole <age 14-25> and each sub-stratum <14-19> and <20-25>); (2) evaluate the eMeasure based on either a specific condition, a specific discharge location, or both; (3) evaluate the eMeasure based on different locations within a facility (e.g., evaluate the overall rate for all intensive care units and also some strata include additional findings <specific birth weights for neonatal intensive care units>).

Term	Definition
Supplemental Data Elements	<p>Supplemental Data Elements are those that should be identified for each patient for whom the measure is applicable. Such additional data can be used to evaluate for disparities in care or to risk adjust with the data listed in this section. CMS defines four required Supplemental Data Elements (payer, ethnicity, race, and ONC Administrative Sex), which are variables used to aggregate data into various subgroups. Comparison of results across strata can be used to show where disparities exist or where there is a need to expose differences in results.</p> <p>Additional supplemental data elements required for risk adjustment or other purposes of data aggregation can be included in the Supplemental Data Element section.</p>
System Clause	The logic that defines the Population, Numerator, Numerator Exclusion, Denominator, Denominator Exclusion, Denominator Exception, Measure Population, or Measure Observation sections.
Terminal Logical Operator	A logical operator (AND, AND NOT, OR, and OR NOT) that is not the top-level logical operator.
Transmission Format	Uniform Resource Locator (URL) or hyperlinks for the transmission formats specified for a particular reporting program.
Value Set	A set of values that contain specific codes derived from a particular code system. The National Library of Medicine’s Value Set Authority Center stores and maintains value sets used within the MAT for measure development.
XML	Extensible Markup Language. XML provides a basic syntax used to share information among different computers, applications, and organizations without needing to pass through many layers of conversion.

Appendices

APPENDIX A: QUALITY DATA MODEL (QDM) ELEMENT STRUCTURE

Each QDM element is composed of a category, a datatype, and a value set. Each QDM element also may have related attributes.

The category is the type of information addressed by the QDM element (e.g., medication, laboratory test, or condition). This is the highest level of definition for a QDM element. The datatype allows the measure developer to assign a context in which the category of information is expected to exist (e.g., “medication, order” vs. “medication, dispensed” vs. “medication, administered”, vs. “medication, active”).

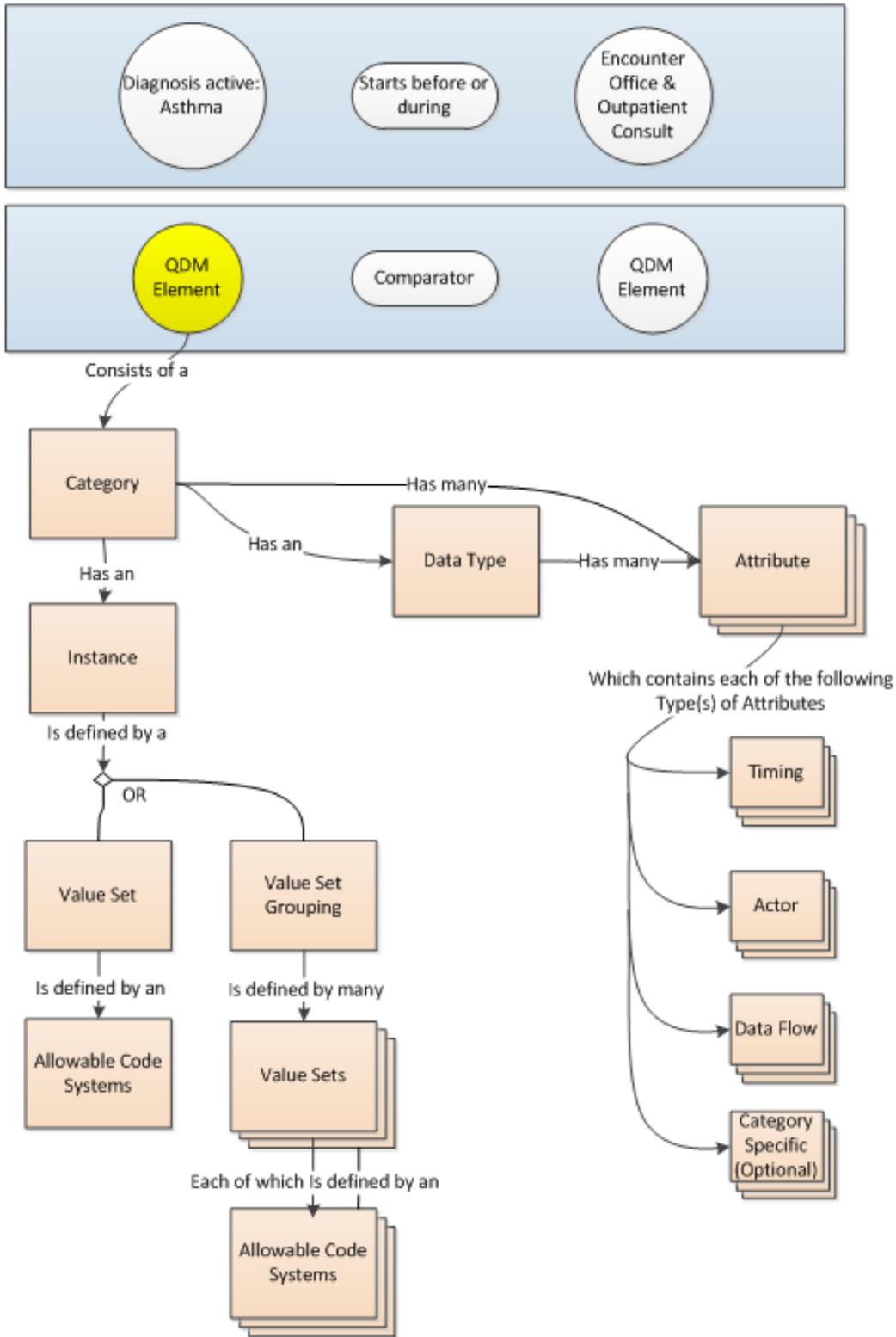
The value set defines the specific instance of the category by assigning a set of values (or codes). For example, the specific RxNorm codes that identify all aspirin-containing compounds formulated for oral use, constitute a value set. Adding the context by applying the datatype “medication, active” allows the measure developer to specify the presence of aspirin on the active medication list. Attributes provide additional information about each QDM element.

All QDM elements have timing (e.g., time of occurrence, start and/or stop times), and actor (source or recorder) attributes. Other attributes including data flow (sender, receiver) and category-specific attributes (e.g., medication attributes include route, and dose).⁴ The following diagram illustrates the relationships among these QDM components.

⁴ QDM Technical Specification, Version 3.0.

<http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=60089>.

Quality Data Model: QDM Element Structure



The image below uses each of these components to describe a QDM element indicating “Diagnosis, asthma.” The category is diagnosis and the datatype is active. It includes a single set of codes using a single code system. In this example, the code system is ICD-10-CM.

The attributes for asthma active can be defined as follows:

Timing: start date/time (e.g., 03/25/2010)

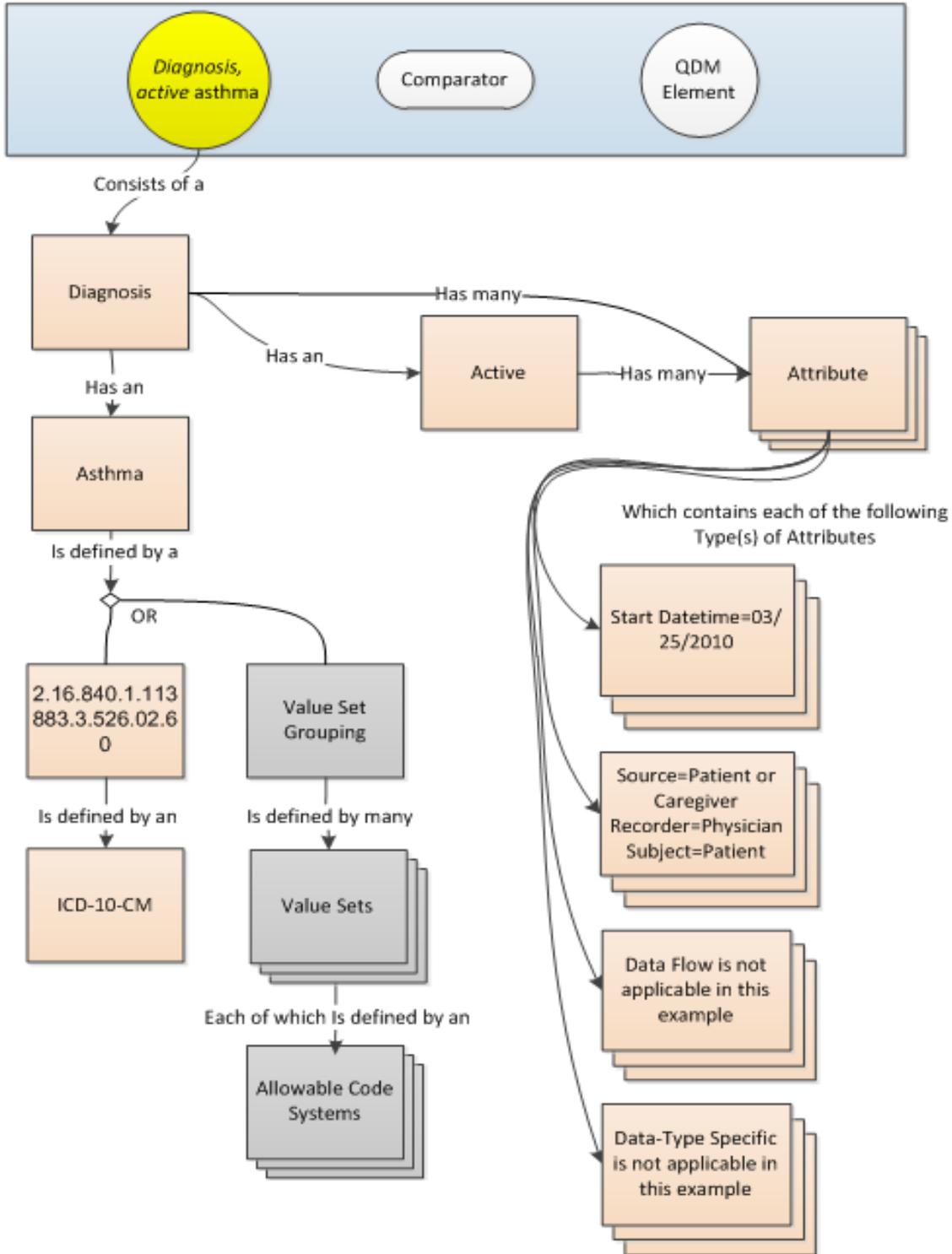
Actor: source (e.g., patient or caregiver) or recorder (e.g., physician)

Data flow (optional): not applicable for this example

Category or data-type specific (optional): not applicable for this example

Quality Data Model: QDM Element Structure

Figure 278 Example of Performance Measure Phrase



For Information on the QDM Categories with Recommended Vocabularies, please reference the Blueprint for the CMS Measures Management System found here: <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/Downloads/Blueprint-120.pdf>.

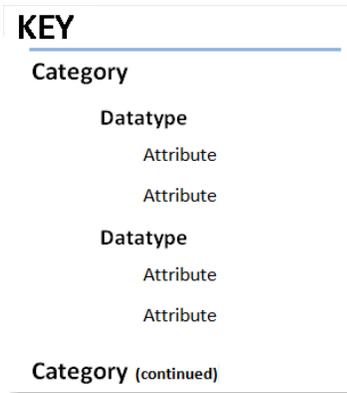
APPENDIX B: QDM COMPONENT MATRIX

The Quality Data Model (QDM) Component Matrix provides a list of allowable code systems. A datatype must be assigned to a value set to create a QDM element. Available category and datatype pairings are listed in the datatype dropdown box used when creating a QDM element in the Create Element page of the Measure Composer. If the QDM element requires further definition through the use of an attribute, the attributes available for use are filtered by the category and datatype combination selected to create the QDM element.

The QDM Component Matrix is organized in alphabetical order by category. Each category is separated by a bar (blue). Under each category are the associated datatypes with each attribute on a separate line. Note: N/A means not applicable. For example, in the Attribute category, there are no datatypes or attributes.

When datatypes extend to the next page, the category name (without a decorative bar) is repeated with the word, “continued”, in parenthesis as noted in the Key below:

Figure 279 Key



QDM Component Matrix

Attribute

N/A

N/A

Assessment

Assessment: Performed

Start Datetime

Stop Datetime

Negation Rationale

Reason

Method

Result

Assessment: Recommended

Start Datetime

Stop Datetime

Negation Rationale

Reason

Method

Care Goal

Care Goal

related to

start Datetime

stop Datetime

target outcome

Communication

Communication: From Patient to Provider

negation rationale

start Datetime

stop Datetime

Communication: From Provider to Patient

negation rationale

start Datetime

stop Datetime

Communication: From Provider to Provider

negation rationale

start Datetime

stop Datetime

Device

Device, Adverse Event

reaction

start Datetime

stop Datetime

Device, Allergy

reaction

start Datetime

stop Datetime

Device, Applied

anatomical approach site

anatomical location site

negation rationale

reason

removal Datetime

start Datetime

Device, Intolerance

reaction

start Datetime

stop Datetime

Device, Order

negation rationale

reason

start Datetime

stop Datetime

Device, Recommended

negation rationale

reason

start Datetime

stop Datetime

Diagnosis

Diagnosis

abatement Datetime
 anatomical location site
 onset Datetime
 severity

Diagnostic Study

Diagnostic Study, Adverse Event

radiation dosage
 radiation duration
 reaction
 start Datetime

Diagnostic Study, Adverse Event continued...

stop Datetime

Diagnostic Study, Intolerance

radiation dosage
 radiation duration
 reaction
 start Datetime
 stop Datetime

Diagnostic Study (continued)

Diagnostic Study, Order

method
 negation rationale
 radiation dosage
 radiation duration
 reason
 start Datetime
 stop Datetime

Diagnostic Study, Performed

facility location
 method
 negation rationale

radiation dosage
radiation duration
reason
result
start Datetime
status
stop Datetime

Diagnostic Study, Recommended

method
negation rationale
radiation dosage
radiation duration
start Datetime
stop Datetime

Encounter**Encounter, Active**

admission Datetime
discharge Datetime
facility location
facility location arrival Datetime
facility location departure Datetime
length of stay
reason

Encounter, Order

facility location
negation rationale
reason
start Datetime
stop Datetime

Encounter, Performed

admission Datetime
diagnosis
discharge Datetime
discharge status

facility location
facility location arrival Datetime
facility location departure Datetime
length of stay
negation rationale
principal diagnosis
reason

Encounter, Recommended

facility location
negation rationale
reason
start Datetime
stop Datetime

Family History**Family History**

onset age
recorded Datetime
relationship

Immunization**Immunization, Administered**

dose
negation rationale
reason
route
start Datetime
stop DatetimeHealth

Immunization, Allergy

reaction
start Datetime
stop Datetime

Immunization, Intolerance

reaction
start Datetime
stop Datetime

Immunization, Order

active Datetime
dose
negation rationale
reason
route
signed Datetime
start Datetime
stop Datetime

Intervention**Intervention, Adverse Event**

reaction
start Datetime
stop Datetime

Intervention, Intolerance

reaction
start Datetime
stop Datetime

Intervention, Order

negation rationale
reason
start Datetime
stop Datetime

Intervention, Performed

negation rationale
reason

Intervention, Performed continued...

start Datetime
stop Datetime

Intervention, Recommended

negation rationale
reason
start Datetime
stop Datetime

Laboratory Test

Laboratory Test, Adverse Event

reaction
start Datetime
stop Datetime

Laboratory Test, Intolerance

reaction
start Datetime
stop Datetime

Laboratory Test, Order

method
negation rationale
reason
start Datetime
stop Datetime

Laboratory Test, Performed

method
negation rationale
reason
reference range high
reference range low
start Datetime
stop Datetime

Laboratory Test, Recommended

method
negation rationale

Laboratory Test, Recommended continued...

reason
start Datetime
stop Datetime

Medication

Medication, Active

cumulative medication duration
dose

frequency
route
start Datetime
stop Datetime

Medication, Administered

cumulative medication duration
dose
frequency
negation rationale
reason
route
start Datetime
stop Datetime

Medication, Adverse Effects

reaction
start Datetime
stop Datetime

Medication, Allergy

reaction
start Datetime
stop Datetime

Medication, Discharge

dose
frequency
negation rationale
refills

Medication, Discharge continued...

route
start Datetime
stop Datetime

Medication, Dispensed

cumulative medication duration
dose
frequency
negation rationale

refills
route
start Datetime
stop Datetime

Medication, Intolerance

reaction
start Datetime
stop Datetime

Medication, Order

active Datetime
cumulative medication duration
dose
frequency
method
negation rationale
reason
refills
route
signed Datetime
start Datetime
stop Datetime

Patient Care Experience**Patient Care Experience**

negation rationale
start Datetime
stop Datetime

Patient Characteristic**Patient Characteristic**

start Datetime
stop Datetime

Patient Characteristic, Birthdate

Start Datetime
Stop Datetime

Patient Characteristic, Ethnicity

N/A

Patient Characteristic, Expired

cause

date

time

Patient Characteristic, Payer

start Datetime

stop Datetime

Patient Characteristic, Race

N/A

Patient Characteristic, Sex

start Datetime

stop Datetime

Patient Clinical Trial Experience

Patient Clinical Trial Experience

reason

start Datetime

stop Datetime

Physical Exam

Physical Exam, Order

anatomical location site

method

negation rationale

reason

start Datetime

Physical Exam, Order continued...

stop Datetime

Physical Exam, Performed

anatomical location site

method

negation rationale

reason

result

start Datetime

stop Datetime

Physical Exam, Recommended

anatomical location site

method

negation rationale

reason

start Datetime

stop Datetime

Procedure

Procedure, Adverse Event

reaction

start Datetime

stop Datetime

Procedure, Intolerance

ordinality

reaction

start Datetime

stop Datetime

Procedure, Order

anatomical approach site

anatomical location site

method

negation rationale

ordinality

radiation duration

Procedure, Order continued...

reason

start Datetime

stop Datetime

Procedure, Performed

anatomical approach site

anatomical location site

incision Datetime

method

negation rationale
ordinality
radiation dosage
radiation duration
reason
result
start Datetime
status
stop Datetime

Procedure, Recommended

anatomical approach site
anatomical location site
method
negation rationale
ordinality
reason
start Datetime
stop Datetime

Provider Care Experience

Provider Care Experience

start Datetime
stop Datetime

Provider Characteristic

Provider Characteristic

start Datetime
stop Datetime

Substance

Substance, Administered

dose
frequency
negation rationale
route
start Datetime

stop Datetime

Substance, Adverse Event

reaction

start Datetime

stop Datetime

Substance, Allergy

reaction

start Datetime

stop Datetime

Substance, Intolerance

reaction

start Datetime

stop Datetime

Substance, Order

dose

frequency

Substance, Order continued...

method

negation rationale

reason

refills

route

start Datetime

stop Datetime

Substance (continued)

Substance, Recommended

dose

frequency

method

negation rationale

reason

refills

route

start Datetime

stop Datetime

Symptom

Symptom

abatement Datetime

onset Datetime

severity

Transfer From

Transfer From

negation rationale

start Datetime

stop Datetime

Transfer To

Transfer To

negation rationale

start Datetime

stop Datetime

APPENDIX C: MEASURE GROUPING RULES

Measure Grouping Rules provides all required and optional system clauses (Initial Patient Population, Numerator, Denominator, Denominator Exclusions, Denominator Exceptions, Measure Population, Measure Observation, and Supplemental Data Elements) by the method of measure scoring. Each Measure Scoring type has a specific set of required and allowable components identified in Table 2.

Table 2 Measure Grouping Rules by Measure Scoring Type

System Clause	Proportion	Ratio	Continuous Variable	Cohort
Initial Populations	Required (1 Allowed Per Grouping)	Required (1 or More Per Grouping) *If more than one, an association is required	Required (1 Allowed Per Grouping)	Required (1 Allowed Per Grouping)
Numerators	Required (1 Allowed Per Grouping)	Required (1 Allowed Per Grouping)	Not Applicable	Not Applicable
Numerator Exclusions	Not Applicable	Optional	Not Applicable	Not Applicable
Denominators	Required (1 Allowed Per Grouping)	Required (1 Allowed Per Grouping)	Not Applicable	Not Applicable
Denominator Exceptions	Optional	Not Applicable	Not Applicable	Not Applicable
Denominator Exclusions	Optional	Optional	Not Applicable	Not Applicable
Measure Populations	Not Applicable	Not Applicable	Required (1 Allowed Per Grouping)	Not Applicable
Measure Populations Exclusions	Not Applicable	Not Applicable	Optional	Not Applicable
Measure Observations	Not Applicable	Optional (Association is optional)	Required (1 Allowed Per Grouping)	Not Applicable

APPENDIX D: HUMAN READABLE MAT User Guide Example: Proportion Measure

eMeasure Title	User Guide Example: Proportion Measure		
eMeasure Identifier (Measure Authoring Tool)	2	eMeasure Version number	0.0.002
NQF Number	None	GUID	1c53456f-00c2-4a29-82b6-bc19023729c9
Measurement Period	January 1, 20XX through December 31, 20XX		
Measure Steward			
Measure Developer			
Endorsed By	None		
Description	A general description of the eMeasure's intent displays here.		
VSAC Value Set Expansion Identifier	MU2 Update 2015-05-01		
Copyright	Copyright information for the eMeasure displays here.		
Disclaimer	Disclaimer information for the eMeasure displays here.		
Measure Scoring	Proportion		
Measure Type	Outcome		
Measure Item Count	Encounter, Performed: Office Visit		
Component Measure	Measure Name	Version Number	GUID
	User Guide Example: Ratio Measure	0.0.000	bb6a8737-6cf3-4373-8093-eb4993077d2f
	User Guide Example: Proportion Measure	0.0.002	1c53456f-00c2-4a29-82b6-bc19023729c9
	User Guide Example: Continuous Variable Measure	0.0.000	8babe4e2-6d86-493a-86f5-2547f9894bfa
	User Guide Example: Cohort Measure	0.0.000	bbfdae66-231b-429b-840e-882177440dc3
Stratification	Information describing the strata for which the measure is being evaluated displays here.		
Risk Adjustment	A description of Risk Adjustment for the eMeasure displays here.		
Rate Aggregation	A description of Rate Aggregation for the eMeasure displays here.		
Rationale	A general description of the evidence used by the expert panel who created the measure displays here. The Rationale is a succinct statement of the need for the eMeasure. The statement usually includes statements pertaining to importance criterion such as impact, gap in care, and evidence.		
Clinical Recommendation Statement	A Clinical Recommendation Statement or general advice regarding the measure and its content developed by the expert panel display here.		
Improvement Notation	Information that indicates whether an increase or decrease in the score is the preferred result (e.g. higher score indicates better quality) displays here.		
Reference	Bibliographic citations or references to clinical practice guidelines, sources of evidence, or other relevant material supporting the measure's intent and rationale display here. When there is more than one reference, they are displayed together, but in separate rows.		
Definition	If applicable, definitions or descriptions of individual terms display here.		
Guidance	Guidance about how to interpret or implement certain components of the eMeasure displays here.		
Transmission Format	URLs that provide the transmission formats that are specified for a particular reporting program display here.		
Initial Population	A description of the Initial Population(s) for the eMeasure display here.		
Denominator	A description of the Denominator(s) for the eMeasure display here.		
Denominator Exclusions	A description of the Denominator Exclusion(s) for the eMeasure display here.		
Numerator	A description of the Numerator(s) for the eMeasure display here.		
Numerator Exclusions	A description of the Numerator Exclusion(s) for the eMeasure display here.		
Denominator Exceptions	A description of the Denominator Exception(s) for the eMeasure display here.		
Supplemental Data Elements	A description of the Supplemental Data Element(s) for the eMeasure display here.		

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- [Risk Adjustment Variables](#)

Population Criteria

- **Initial Population =**
 - AND: Age >= 18 year(s) at: "Measurement Period"
 - AND: \$Encounters
 - AND: \$PregnancyDiagnosis
- **Denominator =**
 - AND: Initial Population
- **Denominator Exclusions =**
 - None
- **Numerator =**
 - AND: "Physical Exam, Performed: Diastolic Blood Pressure" satisfies all:
 - during "Measurement Period"
 - (result <= 90 mmHg)
 - (anatomical location site: Left Arm)
 - AND NOT: "Diagnosis, Active: CHD or CHD Risk Equivalent" starts before start of "Measurement Period"
- **Numerator Exclusions =**
 - None
- **Denominator Exceptions =**
 - None
- **Stratification =**
 - None

Data Criteria (QDM Variables)

- **\$Encounters =**
 - Union of:
 - "Encounter, Performed: Office Visit"
 - "Encounter, Performed: Face to Face Interaction"
 - "Encounter, Performed: Preventative Care Services Established Office Visit, 18 and Up"
 - "Encounter, Performed: Preventative Care Services, Initial Office Visit 18 and Up"
 - "Encounter, Performed: Home Healthcare Services"
 - "Encounter, Performed: Annual Wellness Visit"
 - during "Measurement Period"
- **\$PregnancyDiagnosis =**
 - "Diagnosis, Active: Pregnancy" starts before end of "Measurement Period"

Data Criteria (QDM Data Elements)

- "Diagnosis, Active: CHD or CHD Risk Equivalent" using "CHD or CHD Risk Equivalent Grouping Value Set (2.16.840.1.113883.3.600.863)"
- "Diagnosis, Active: Pregnancy" using "Pregnancy Grouping Value Set (2.16.840.1.113883.3.526.3.378)"
- "Encounter, Performed: Annual Wellness Visit" using "Annual Wellness Visit User Defined QDM Value Set (1.1.1.1)"
- "Encounter, Performed: Face to Face Interaction" using "Face to Face Interaction User Defined QDM Value Set (1.1.1.1)"
- "Encounter, Performed: Home Healthcare Services" using "Home Healthcare Services Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1016)"
- "Encounter, Performed: Office Visit" using "Office Visit Grouping Value Set (2.16.840.1.113883.3.464.1003.101.12.1001)"
- "Encounter, Performed: Preventative Care Services Established Office Visit, 18 and Up" using "Preventative Care Services Established Office Visit, 18 and Up User Defined QDM Value Set (1.1.1.1)"
- "Encounter, Performed: Preventative Care Services, Initial Office Visit 18 and Up" using "Preventative Care Services, Initial Office Visit 18 and Up User Defined QDM Value Set (1.1.1.1)"
- "Physical Exam, Performed: Diastolic Blood Pressure" using "Diastolic Blood Pressure Grouping Value Set (2.16.840.1.113883.3.526.3.1033)"
- Attribute: "Anatomical location site: Left Arm" using "Left Arm User Defined QDM Value Set (1.1.1.1)"

Supplemental Data Elements

- "Patient Characteristic Ethnicity: Ethnicity" using "Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)"
- "Patient Characteristic Payer: Payer" using "Payer Source of Payment Typology Value Set (2.16.840.1.114222.4.11.3591)"
- "Patient Characteristic Race: Race" using "Race CDC Value Set (2.16.840.1.114222.4.11.836)"
- "Patient Characteristic Sex: ONC Administrative Sex" using "ONC Administrative Sex Administrative Sex Value Set (2.16.840.1.113762.1.4.1)"

Risk Adjustment Variables

- None

Measure Set	If applicable, a description of the Measure Set for the eMeasure display here.
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APPENDIX E: VALIDATION GUIDANCE

Validations occur throughout the MAT to guide users as they develop eMeasure logic. The following tables, organized by tool page, provide a description of the messages received when a validation occurs and guidance to resolve the errors identified in the messages. Not all errors are identified with a descriptive message; some errors will be identified with a warning icon. Both scenarios are addressed in the tables.

[Measure Composer – QDM Applied Elements Validation Guidance](#): describes the validation warning icons received in the Applied Elements list. Validation is initiated by selecting the Update From VSAC button below the Applied Elements list.

[Measure Composer – Clause Workspace Validation Guidance](#): describes the validation messages received in the Clause Workspace. Validation is initiated by selecting the Validate button located below the workspace.

[Measure Composer – Population Workspace Validation Guidance](#): describes the validation messages received in the Population Workspace and all the pages within the Population Workspace (i.e. Populations, Measure Observations, and Stratification). Validation is initiated by selecting the Validate button located below the measure populations, measure observation(s), or strata.

[Measure Composer – Measure Packager \(Measure Grouping\) Validation Guidance](#): describes the validation messages received when creating a measure grouping or a measure package. Validation of a measure grouping occurs when the Create Measure Grouping button is selected below the grouping workspace. Validation of a measure package occurs when the Create Measure Package or Create Package and Export buttons are selected. The error messages and guidance for resolving the identified errors are included in this section.

[Measure Composer – Measure Packager \(Create Measure Package\) Validation Guidance](#): describes the validation messages received when creating a measure grouping or a measure package. Validation of a measure grouping occurs when the Create Measure Grouping button is selected below the grouping workspace. Validation of a measure package occurs when the Create Measure Package or Create Package and Export buttons are selected. The error messages and guidance for resolving the identified errors are included in this section.

Table 3 QDM Elements - Applied Elements Validation Guidance

Message	Condition for Message	Additional Guidance
No message, but a yellow warning icon appears to the left of OID.	Invalid OID.	Verify the OID is correct. Is an invalid OID entered? The invalid OID must be replaced with a valid OID.
No message, but a yellow warning icon appears to the left of OID.	User-defined QDM element.	All user-defined QDM elements display the yellow warning icon. No VSAC value set data are retrieved for this QDM element.
No message, but a yellow warning icon appears to the left of OID.	Unable to retrieve VSAC value set data.	Verify a green circle is visible to the left of the UMLS Active notification in the top, right corner of the page indicating an active connection to the VSAC. If yes, submit an inquiry to the VSAC as to why this particular value set data is not being retrieved. The MAT displays all data provided by the VSAC through the API.
No message, but a yellow warning icon appears to the left of datatype.	Invalid datatype.	The datatype assigned is no longer a valid datatype. The existing QDM element must be modified to include a valid datatype. Review the most recent QDM for information about available datatypes.
OID is already applied in combination with Datatype, Version, or Expansion Identifier.	An OID is used more than once with a different datatype or as a Specific Occurrence, and the user is attempting to add or modify a QDM element or attribute using the same OID, but with a different Version or Expansion Identifier.	To resolve, the added or modified QDM element must use the same Version or Expansion Identifier.

Table 4 Measure Composer - Clause Workspace Validation Guidance

Message	Condition for Message	Additional Guidance
No message, but QDM Element appears in red.	A QDM element applied to the clause contains an invalid datatype.	The datatype assigned is no longer a valid datatype. The existing QDM element must be modified to include a valid datatype. MAT version 4.6 performs validations based on the QDM version 4.3 published in September of 2016.
No message, but QDM element appears in red.	An invalid attribute applied to a QDM element.	The attribute applied is no longer a valid or available attribute. The attribute must be modified to an existing attribute option or be removed.
No message, but QDM element appears in red.	The QDM element Measurement End Date: Timing Element is applied to the clause.	Measurement End Date: Timing Element is an invalid option. This QDM element must be deleted and clause logic updated using the current QDM (https://ecqi.healthit.gov/qdm)
No message, but QDM element appears in red.	The QDM element Measurement Start Date: Timing Element is applied to the clause.	Measurement Start Date: Timing Element is an invalid option. This QDM element must be deleted and clause logic updated using the current QDM (https://ecqi.healthit.gov/qdm).
No message, but QDM element appears in red.	The QDM element Patient Characteristic Birthdate with an outdated OID is applied to the clause.	Existing Patient Characteristic Birthdate must be replaced with Patient Characteristic Birthdate "21112-8", which is available by default in the QDM Element list box in the right-click menu of the Clause Workspace.
No message, but QDM element appears in red.	The QDM element Patient Characteristic Expired with an outdated OID is applied to the clause.	Existing Patient Characteristic Expired must be replaced with Patient Character Expired "419099009", which is available by default in the QDM Element list box in the right-click menu of the Clause Workspace.
Measure logic is incomplete. Clause must contain logic.	The displayed clause does not contain measure logic.	Add measure logic to the clause or delete the clause.
Measure logic is incomplete. Union, Intersection, and Datetimediff must contain at least two or more child nodes.	Union, Intersection, or Datetimediff are used in the measure logic and contain less than 2 child nodes.	To resolve, ensure Union, Intersection or Datetimediff have a minimum of two child nodes.

Message	Condition for Message	Additional Guidance
Measure logic is incomplete. LHS and RHS are required for Timings, Relationships and Satisfies functions. (A Timing appears in red text.)	A Timing is used in the clause logic without a LHS and RHS.	Measure logic is incomplete when a Timing (During, Ends After End Of, Starts Before End Of, Starts During, etc.) is applied to the clause logic, and there is not a LHS and RHS added. To resolve add the missing LHS and/or RHS.
Measure logic is incomplete. LHS and RHS are required for Timings, Relationships and Satisfies functions. (The relationship Fulfills appears in red text.)	The Relationship <i>Fulfills</i> is used in the Clause without a LHS and RHS.	Measure logic is incomplete when the Relationship <i>Fulfills</i> is applied to the clause logic, and there is not a LHS and RHS added. To resolve, add the missing LHS and/or RHS.
Measure logic is incomplete. LHS and RHS are required for Timings, Relationships and Satisfies functions. (SATISFIES ALL or SATISFIES ANY appears in red text.)	The function(s) Satisfies All or Satisfies Any are used in the measure logic without a LHS and RHS.	When Satisfies All and Satisfies Any are used, an QDM element must exist for the LHS and one or more RHS(s). To resolve, add the missing LHS and/or RHS(s).
Measure logic is incomplete. Satisfies All and Satisfies Any must contain at least three or more child nodes.	The functions Satisfies All or Satisfies Any are applied, but they contain less than 3 child nodes.	Satisfies All must contain one QDM element for the LHS, and then two or more child nodes for the RHS. To resolve, add additional child nodes to meet the minimum requirement.
Measure logic is incomplete. Satisfies All and Satisfies Any LHS QDM element may not contain attributes. (Satisfies All or Satisfies Any appears in red text.)	An attribute is applied to the left-hand side (LHS) QDM element for a Satisfies All or Satisfies Any clause.	Remove the attribute applied to the LHS QDM element of the highlighted Satisfies All or Satisfies Any clause.
Measure logic is incomplete. Invalid clause(s) used in logic. (Invalid clause appears in red text.)	A clause added to the displayed clause has incomplete logic. The text of the clause name appears in red.	To resolve, return to the clause appearing in red, validate to identify the error, and correct the identified error. Once the error is corrected, this clause will pass validation when used within another clause.

Table 5 Measure Composer - Population Workspace Validation Guidance

Message	Condition for Message	Additional Guidance
<p>Measure logic is incorrect. Invalid clause logic. Please validate clause logic on Clause Workspace. (Clause containing invalid logic appears in red text.)</p>	<p>There is more than one condition for this message. The clause may contain an invalid attribute, invalid datatype, invalid clause, an incomplete clause, or a clause without measure logic.</p>	<p>Return to the Clause Workspace and validate the clause identified. Correct the clause as indicated. View the Clause Workspace validation guidance for additional information as to how to produce a valid clause.</p>
<p>Measure logic is incorrect. Logic must only contain clauses and logical operators. (Components which fail validation appear in red text.)</p>	<p>Within the Population Workspace, invalid use of logical operators (AND, AND NOT, OR, OR NOT) and clause logic not constructed in the Clause Workspace are applied.</p>	<p>The only permitted components allowed in the Population Workspace are logical operators (AND, AND NOT, OR, and OR NOT) and/or clauses built within the Clause Workspace. Clauses built in the Clause Workspace are named by the creator and do not display the actual clause logic. The invalid components display in red and must be removed from the Population Workspace.</p>
<p>Measure logic is incorrect. Logic must only contain clauses. (Components which fail validation appear in red text.)</p>	<p>Within the Measure Observations page of the Population Workspace, logical operators (AND, AND NOT, OR, OR NOT) are applied.</p>	<p>After the MAT v4.0.2, logical operators (AND, AND NOT, OR, OR NOT) are removed as available options for defining Measure Observations. Delete logical operators and add desired the clause. The only permitted components allowed on the Measure Observations page of the Population Workspace are clauses built within the Clause Workspace. Clauses built in the Clause Workspace have the clause name defined by the creator and do not display the actual clause logic. The invalid components display in red and must be removed from the Measure Observations page of the Population Workspace.</p>

Message	Condition for Message	Additional Guidance
<p>Measure logic is incorrect. Any logical operator under a top-level logical operator must contain at least one logical operator or clause. Any terminal logical operator under a top-level logical operator must contain at least one clause. (The terminal logical operator appears in red text.)</p>	<p>A top-level logical operator does not have a clause or terminal logical operator, or a terminal logical operator does not contain a clause. *A terminal logical operator is any logical operator (AND, AND NOT, OR, OR NOT) added to the top-level AND or OR.</p>	<p>To resolve perform one of the following actions: add a terminal logical operator or a clause to the top level logical operator; remove the terminal logical operator that does not have a clause, or add a clause as a child of the terminal logical operator.</p>
<p>Measure logic is incorrect. Highlighted clause contains DATETIMEDIFF function. (Components which fail validation appear in red text.)</p>	<p>The function DATETIMEDIFF is being utilized in Populations or Stratification.</p>	<p>The function DATETIMEDIFF is to be used only for Measure Observations. It must be deleted if used in the measure's populations or stratification.</p>
<p>Measure logic is invalid. Contents of the clause logic are not permitted for Measure Observations.</p>	<p>If the top node contains a function with a comparison in Measure Observation, it is identified as invalid logic.</p>	<p>Remove the invalid content (function with a comparison) to resolve this error message.</p>

Table 6 Measure Composer - Measure Packager (Measure Grouping)
Validation Guidance

Message	Condition for Message	Additional Guidance
For a Proportion measure, a grouping must contain exactly one of each of the following: Population, Denominator and Numerator.	The measure grouping does not contain a minimum of one Initial Population, one Denominator, and one Numerator.	To resolve, add the missing required population(s) to the measure grouping.
For a Proportion measure, a grouping may not contain more than one of each of the following: Denominator Exclusions and Denominator Exceptions.	More than one Denominator Exclusions or Denominator Exceptions is applied to a measure with a proportion scoring type.	To resolve, remove the extra Denominator Exclusions or Denominator Exceptions from the measure grouping.
For a Proportion measure, a grouping may not contain a Numerator Exclusion, Measure Population, or Measure Observation.	Numerator Exclusion, Measure Population, and Measure Observation are not valid populations for a measure with a proportion scoring type.	To resolve, remove the Numerator Exclusion, Measure Population, or Measure Observation from the measure grouping.
For a Ratio measure, a grouping must contain exactly one of each of the following: Denominator and Numerator.	The measure grouping does not contain the required one Denominator and one Numerator for a measure with a ratio scoring type.	To resolve, remove extra Denominators or Numerators from the measure grouping. If a Denominator or Numerator is not part of the measure grouping, add the missing population.
For a Ratio measure, a grouping may not contain more than one of each of the following: Denominator Exclusion and Numerator Exclusion.	More than one Denominator Exclusion or Numerator Exclusion is applied to a measure with a ratio scoring type.	To resolve, remove the extra Denominator Exclusion or Numerator Exclusion from the measure grouping.
For a Ratio measure, a grouping may not contain more than two of the following: Initial Populations.	More than two Initial Populations is applied to the measure grouping for a measure with the ratio scoring type.	To resolve, update to the measure grouping so that it contains no more than two Initial Populations.
For Ratio measures, in the case of more than one Initial Population, Numerator and Denominator must contain one association.	When more than one Initial Population is added to the measure grouping for measures with a ratio scoring type, the numerator and denominator must contain one association.	To resolve, associate one Initial Population in the measure grouping to the Denominator and associated the remaining Initial Population to the Numerator.

Message	Condition for Message	Additional Guidance
For a Ratio measure, a grouping may not contain a Denominator Exception or Measure Population.	A Denominator Exception or Measure Population is added to the measure grouping for a measure with a ratio scoring type.	To resolve, remove the Denominator Exception or Measure Population from the measure grouping.
For a Ratio measure, a grouping must contain at least one Initial Population.	An Initial Population is not applied to the measure grouping for a measure with a ratio scoring type.	To resolve, add at least one Initial Population to the measure grouping.
For a Continuous Variable measure, a grouping must contain exactly one of each of the following: Initial Population, Measure Population, and at least one Measure Observation.	The minimum measure grouping requirements for a measure with a continuous variable scoring type are not met.	To resolve, ensure that the minimum measure grouping requirements for a measure with a continuous variable scoring type are met. There should be a one Initial Population, one Measure Population, and at least one Measure Observation.
For a Continuous Variable measure, a grouping may not contain any Numerator, Numerator Exclusions, Denominator, Denominator Exclusions, or Denominator Exceptions.	A Numerator, Numerator Exclusions, Denominator, Denominator Exclusions, or Denominator Exceptions are added to the measure grouping for a measure with a continuous variable measure scoring type.	To resolve, remove any Numerators, Numerator Exclusions, Denominator, Denominator Exclusions, or Denominator Exceptions from the measure grouping.
For a Cohort measure, a grouping must contain exactly one Initial Population.	More than one Initial Population is added to a measure with the scoring type Cohort.	To resolve, remove any additional Initial Populations in the measure grouping so the measure grouping contains just one Initial Population.
Measure Grouping cannot contain more than one Stratification.	More than one Stratification is added to a measure with the scoring type of proportion, ratio, continuous variable, or cohort.	To resolve, remove any extra Stratifications from the measure grouping. Only one Stratification may be applied per measure grouping regardless of measure scoring type.

**Table 7 Measure Composer - Measure Packager (Create Measure Package)
Validation Guidance**

Message	Condition for Message	Additional Guidance
A Grouping is required.	No measure groupings are created.	To resolve, return to the top of the Measure Details page and create at least one measure grouping. Remember to select the Save Grouping button to retain the created measure grouping.
Unable to create measure package. Please validate your measure logic in both Population Workspace and Clause Workspace.	The measure logic included in the measure populations added to the measure groupings contains errors.	To resolve, return to Population Workspace and select the Validation button for Populations, Measure Observations, and Stratification. The logic containing errors will appear in red text and/or display an informative validation message. The errors must be resolved to create a successful measure package.
Measure packaged successfully. One or more OIDs could not be updated from VSAC.	One or more of the value sets used within the measure does not contain a valid OID. This may be as a result of using user-defined QDM elements or using a value set with an invalid OID.	Return to the QDM Elements tab of the Measure Composer and review the Applied Elements page. By selecting 'Update from VSAC', any invalid OIDs will appear with a yellow warning icon to the left of the OID or the text 'User-Defined Element'. Replace these items, if used within the measure logic, with a valid OID to prevent this message.
Measure packaged successfully. Please access the Measure Library to export the measure.	The measure package has been successfully generated.	Return to the Measure Library. Select the yellow icon in the 'Export' column for the packaged measure. The option to view or save the human readable, Simple XML, value set Excel spreadsheet, and the measure package are available for the packaged measure. (Of note, the VSAC value set spreadsheet will only contain data if the 'Include VSAC Value Set Data' checkbox was selected when the measure package was created.)

Message	Condition for Message	Additional Guidance
<p>Measure Package Failed. VSAC request timed out. Please contact Help Desk.</p>	<p>The connection to the VSAC has been disrupted and is not related to the user's actions.</p>	<p>The connection to the VSAC may have timed out. Please attempt to reconnect to the VSAC by reentering UMLS credentials in the UMLS Account tab of the MAT. If the attempt to connect to the VSAC fails, please contact the MAT Help Desk so we are aware of the failed connection to the VSAC.</p>
<p>Measure packaged successfully. Value set data is not included in the measure package as you are not logged into UMLS.</p>	<p>The 'include VSAC value set data' checkbox is selected, but there is not an active connection to the VSAC.</p>	<p>Connect to the VSAC by entering UMLS credentials on the UMLS Account page of the MAT, and then repackage the desired measure.</p>