NATIONAL QUALITY FORUM

Measure Authoring Tool 2012 Update
User Guide

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Preface

The National Quality Forum (NQF) is a nonprofit organization that operates under a three-part mission to improve the quality of American healthcare by:

- building consensus on national priorities and goals for performance improvement and working in partnership to achieve them;
- endorsing national consensus standards for measuring and publicly reporting on performance; and
- promoting the attainment of national goals through education and outreach programs.

As part of this mission, and to drive continuous quality improvement in the American healthcare system, NQF has developed basic infrastructure and supporting software. The Measure Authoring Tool (MAT) enables expression of measures for the electronic environment (eMeasures) and supports reporting directly from clinical information systems. This document provides overview of the MAT, its purpose, and value, and offers instructions on how to create eMeasures.

This work was conducted under the contract Consensus-Based Entities Regarding Healthcare Performance Measurement from the Department of Health and Human Services (http://www.dhhs.gov). This report is available to the public at http://www.qualityforum.org. When disseminating this report, please use the following citation to indicate NQF's authorship of this User Guide.

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Accessibility

The Measure Authoring Tool (MAT) and associated functions should be accessible via screen readers and other accessibility tools. For an alternative means of accessing information about the MAT on the National Quality Forum (NQF) website, please contact the MAT Help Desk at MATsupport@qualityforum.org. When submitting an e-mail request, provide details about the issue, the web address of the requested information, and your contact information.

I. SECTION 508: EIT ACCESSIBILITY

NQF is committed to making its website and electronic information technology (EIT) accessible to the widest possible audience, including individuals with disabilities. In keeping with this goal, NQF 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 that when federal agencies procure, develop, maintain, or use EIT, they ensure that federal employees and members of the public with disabilities have access to and use of information and data that is comparable to for 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, which became enforceable on June 21, 2001. The Access Board's standards set forth a definition of EIT and the technical and functional provisions and performance criteria necessary for compliance with Section 508.

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 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.

II. ADOBE PDF

Many of our documents are available in PDF format. Version 6.0 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 plug-in is available free from Adobe. To install the latest version of the Adobe Reader, go to: http://www.adobe.com/reader.

Reader 6.0 synthesizes the text in Adobe PDF files into speech, using 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 read "Adobe Acrobat 6.0 and Accessibility."

The MAT and the MAT User Guide have a Read Out Loud option, which can be accessed in Adobe Acrobat 6.0 by using the following key board shortcuts:

- View single page: Shift + Ctrl + V
- Read entire document: Shift + Ctrl + B

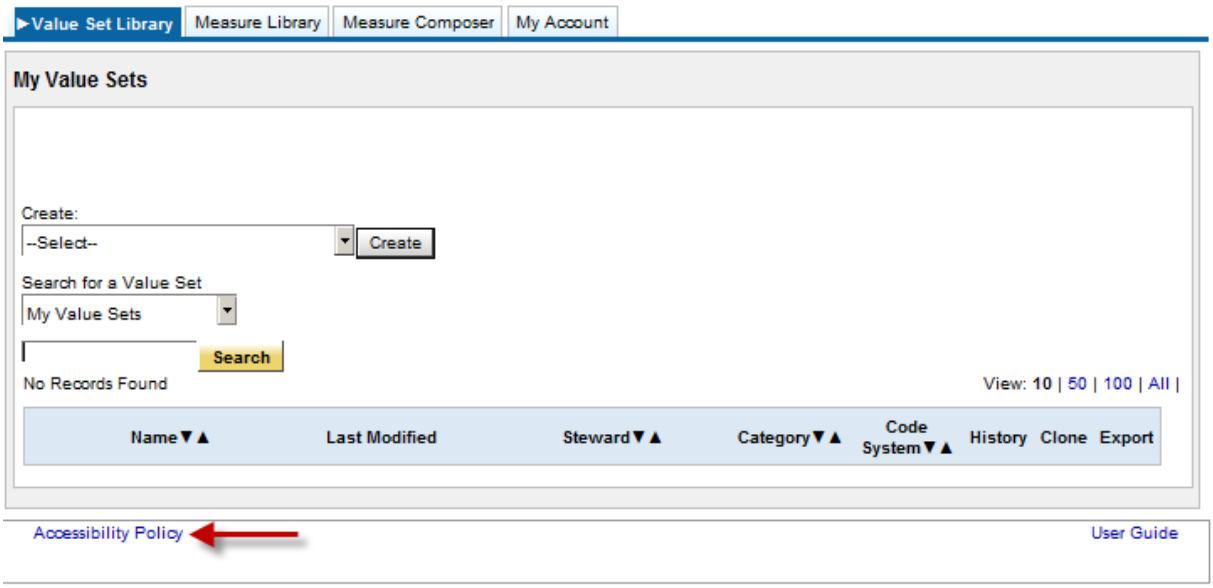
If you use screen reader software that is not compatible with Adobe Reader (for example, an audio-enabled web browser), Adobe provides a free online tool that converts the content of PDF files to a format that most screen reader applications can understand. If you need assistance converting PDF documents,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

III. EXCEL VIEWER

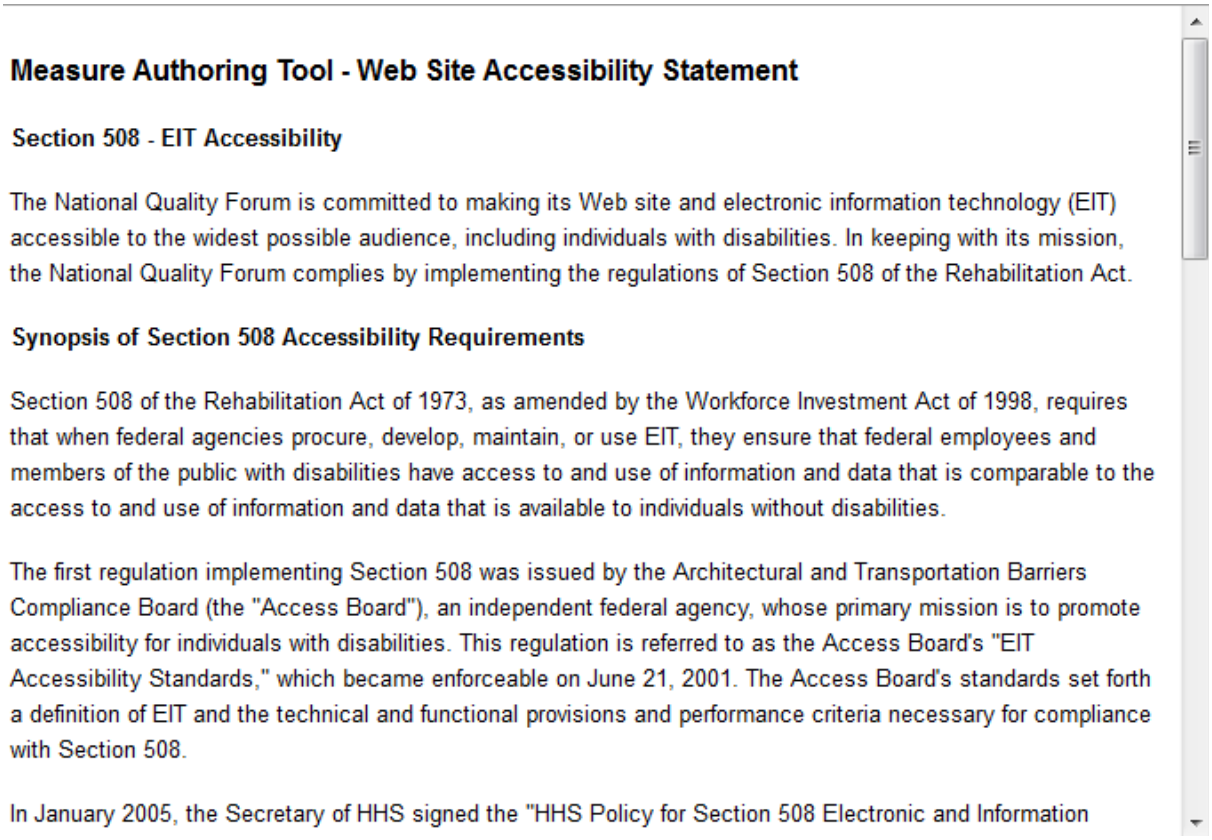
Several of our documents are available in Microsoft Excel format. The Microsoft Excel Viewer may be required to view and print the Excel files. To install the latest version of Excel Viewer, go to: Excel Viewer Download (http://www.microsoft.com/download/en/details.aspx?id=10).

IV. MEASURE AUTHORING TOOL ACCESSIBILITY POLICY

The Measure Authoring Tool (MAT) Accessibility Policy is located at the bottom of each page in the MAT. Please refer to the image below.



After selecting the Accessibility Policy link, the Accessibility Policy will display in a new window.



Measure Authoring Tool - Web Site Accessibility Statement

Section 508 - EIT Accessibility

The National Quality Forum is committed to making its Web site and electronic information technology (EIT) accessible to the widest possible audience, including individuals with disabilities. In keeping with its mission, the National Quality Forum complies by implementing the regulations of Section 508 of the Rehabilitation Act.

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In January 2005, the Secretary of HHS signed the "HHS Policy for Section 508 Electronic and Information

Chapter 1

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]

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[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.

NQF's formal Consensus Development Process (CDP) (http://www.qualityforum.org/Home.aspx) is designed to evaluate and endorse consensus standards, including performance measures, best practices, frameworks, and reporting guidelines. The CDP is a multi-step process that ensures transparency, public input, and discussion among representatives across the healthcare field, including consumers, purchasers, providers, suppliers, data aggregators, data analyzers, and others affecting the healthcare industry.

Today, NQF has a portfolio of endorsed performance measures that can be used to measure processes, outcomes, patient perceptions, and organizational systems affecting quality of care. The science of measuring healthcare performance has made enormous progress over the last decade and continues to evolve.

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.

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 that NQF "retool," or convert, 113 NQF-endorsed® measures from traditional paper-based measures to electronic measures, or "eMeasures," to be compatible with or readable by EHR systems.

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

[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.

- 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. NQF develops and maintains the QDM to promote a shared understanding among stakeholders so they can communicate and interpret quality measures consistently in electronic clinical applications. Measure developers using the QDM can consistently describe a quality measure's criteria, allowing for more accurate performance comparison. Current quality measures may use various additional appendices and documents to capture the detail required for the measure.

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 uses the QDM to describe measure criteria consistently, using industry standard code systems for each category of information, which is consistent with the approach for sharing information among clinical information systems (interoperability). Examples include RxNorm,[4] which is a code system used to identify medications, or LOINC,[5] which is used to define laboratory tests. As such, in the MAT, measure developers create and reuse value sets from the standard terminologies. NQF will continue to collaborate with The Office of the National Coordinator for Health Information Technology (ONC) Health IT Standards Committee's Vocabulary Task Force to identify appropriate code systems for future use with each QDM category.[6]

[4] United States National Library of Medicine (NLM), National Institutes of Health, *Unified Medical Language System: RxNorm*. Available at http://www.nlm.nih.gov/research/umls/rxnorm/. Last accessed November 2011.

[5] *Logical Observation Identifiable Names and Codes*. Available at http://www.loinc.org/. Last accessed November 2011.

[6] U.S. Department of Health and Human Services (HHS),HIT Standards Committee: Recommendations to the National Coordinator for Health IT, September 9, 2011 Transmittal Letter Washington, DC: HHS; 2011. Available at http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_recommendations/1818

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

- Value Set, the 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 *data type* (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 data type "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, recorder, or subject) attributes. Other attributes include *data flow* (sender, receiver) and category-specific attributes (e.g., medication attributes include route, and, dose).[7]

The structure of a QDM element is shown in more detail in Appendix A. This appendix illustrates the relationships among QDM categories, data types, and value sets. The Quality Data Model Component Matrix (Appendix B) provides a list of HITSC Clinical Quality Workgroup and Vocabulary Task Force recommended code systems as well as allowable code systems in the MAT. The QDM Component Matrix also lists all possible combinations of QDM categories by data types and attributes.

The application of the QDM to eMeasures will become clearer as this User Guide steps through an existing measure supplied by the Oklahoma Foundation for Medical Quality (OFMQ)[8] to guide users through the process. The eMeasure is provided in Appendix C.

IV. HOW TO USE THIS USER GUIDE

This User Guide (published October 22, 2012) accompanies the August 20, 2012 release of the Measure Authoring Tool (MAT). The User Guide is designed for use by beginner-

[7] NQF, *QDM Technical Specification, Version 3.0*, Washington, DC: NQF; 2011. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=60089. Last accessed November 2011.

[8] Oklahoma Foundation for Medical Quality (OFMQ). Cardiac Surgery Patients With Controlled 6 A.M. Postoperative Blood Glucose (NQF 0300). Clinical Quality Measure Set 2011-2012.

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.

The goal of this guide is to:

1) provide a clear picture of the overall purpose of the MAT;
2) provide users with detailed guidelines and instructions on how to use the MAT to build an eMeasure;
3) describe the MAT's features and capabilities, its importance, and how it should be used; and
4) 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 used for. Questions may include: What are system requirements? How do I request a new password? What is the relationship between the MAT and eMeasures?

Users moving 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: My Account—The "My Account" tab allows users to update their personal information. Password maintenance features can be accessed through this tab and are described in this chapter.

Chapter 6: Value Set Library—The "Value Set Library" allows users to view all value sets in the MAT.

Chapter 7: Measure Library—The "Measure Library" tab is the home page from which measures can be added, selected for editing or updates, or viewed.

The "Measure Composer" allows users to detail all of the selected measure's components and logic. It consists of four chapters:

Chapter 8: Measure Composer-Measure Details—The Measure Details sub-tab lets users specify information about the measure (metadata) that appears in the measure header section of the eMeasure.

Chapter 9: Measure Composer-Clause Workspace—The Clause Workspace sub-tab allows users to specify the detail and the logic of the measure using the value sets created in the "Value Set Library."

Chapter 10: Measure Composer-Measure Packager—The Measure Packager sub-tab allows the user to select measure components created in the Clause Workspace to express (or package) the measure fully so it can be ready for export.

The User Guide draws on the Oklahoma Foundation for Medical Quality's Cardiac Surgery Patients with Controlled 6 A.M. Postoperative Blood Glucose (NQF 0300) to illustrate how to create an eMeasure using the MAT. To view OFMQ's measure in human readable format, please refer to Appendix C.

The icon, below, illustrates that an example is being displayed.

 *Example*

And, notes provided 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

Chapter 2: System Availability and Requirements

Chapter Overview:

This chapter lists the minimum hardware and software requirements to access the Measure Authoring Tool (MAT) effectively.

I. HARDWARE

- Processing speed: 2GHz (recommended). Slower-than-normal processing speed will occur on computers with a lower processing speed. This 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 7.0 or 8.0, Firefox 3.6 or higher. Users may open the Measure Authoring Tool (MAT) with other browsers, but they are not supported at this time.
- Operating systems: Microsoft Windows XP Service Pack 6. Users may open the MAT in other operating systems, but they are not supported at this time.

III. INTERNET CONNECTION

The Measure Authoring Tool (MAT) is accessible via any Internet connection running on a minimum of 56k modem or high-speed connection.

IV. SYSTEM AVAILABILITY

The Measure Authoring Tool (MAT) is available 24 hours a day, 7 days a week at https://mat.qualityforum.org. MAT users will be notified via e-mail about scheduled and unscheduled system maintenance days. The MAT undergoes a scheduled maintenance 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 or will be limited during those times. A secondary maintenance window is reserved to begin at 8:00 pm ET on the second Tuesday of each month.

When accessing the MAT after a system maintenance day, please delete the browser history to prevent browser caching error.

Chapter 3

Chapter 3: Account Setup and Sign-In

> **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.*

I. APPLY FOR A MAT USER ACCOUNT

To access the MAT, applicants must complete an online application form and agree to the Terms of Use. Users will receive log-in information within two business days of submitting their application. Before submitting the form, users will need to know their organization's Object Identifier (OID) and OID convention for value sets. A brief explanation of OIDs and a tutorial demo on applying for a MAT account and OIDs are available on the Measure Authoring Tool web page at http://www.qualityforum.org/MAT.

II. ACCOUNT LOG-IN

This section provides guidance on how a user can log into the MAT.

The user will receive two e-mails with log-in information within two business days of submitting an application for a MAT account. The first e-mail notifies the user that the account has been created and provides a link to the MAT webpage.

Date: 12/13/2011 10:31 AM
From: MATRegistration@qualityforum.org
Subject: MAT Application access

You have been granted access to the Measure Authoring Tool. Your temporary password will be sent in a separate email. To access the Measure Authoring Tool, please go to mat.qualityforum.org.

The second e-mail contains a temporary password for the initial sign-in.

Date: 12/13/2011 10:32 AM
From: MATRegistration@qualityforum.org
You have been assigned a temporary password to the Measure Authoring Tool. Your temporary password is AAA11111*

To access the MAT, complete the following steps:

1) Open a supported browser (Internet Explorer and Mozilla Firefox are supported browsers; Safari and Chrome are not supported).

2) Go to **https://www.mat.qualityforum.org.**

3) Enter information in the following fields: **E-Mail Address** and **Password**.

4) Select Sign In.

5) Next, the MAT will ask users to create a password and provide security questions. The security questions will be helpful if users lose their passwords.

The next section lists the step-by-step process to change an account password.

III. CHANGE PASSWORD AND ANSWER SECURITY QUESTIONS

When users initially sign into the MAT, they will be directed to update their password and to answer security questions. Users then must complete the following steps to change the account password and to answer security questions.

1. When signing into the MAT with a temporary password, users will be prompted to create and then confirm a new password. For security purposes, the system requires a ***strong*** password (defined below).

   Passwords must contain:
   - 8-16 characters in length;
   - An uppercase character;
   - A lowercase character;
   - A numeric character; and
   - One of the following special characters: % * # + - , : = ?

2. Confirm the new password.

3. Users will be required to select three different security questions and provide answers to those security questions. Answers may not be duplicated.

4. Click **Submit** to sign into the MAT.

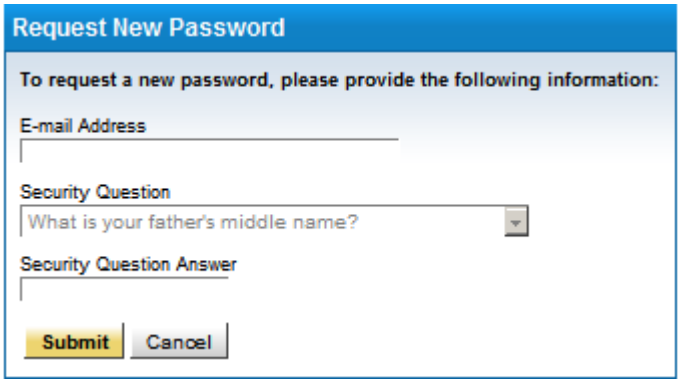
IV. RESET FORGOTTEN PASSWORD

The **Forgot Your Password** function on the log-in page provides sign-in assistance. Users must complete the following steps:

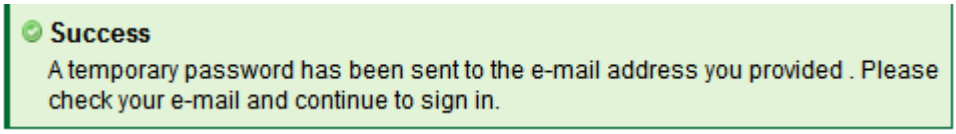
5. Select the **Forgot Your Password** link on the sign-in screen.

6. The user must enter his or her e-mail address and hit the tab key to enable the security questions.

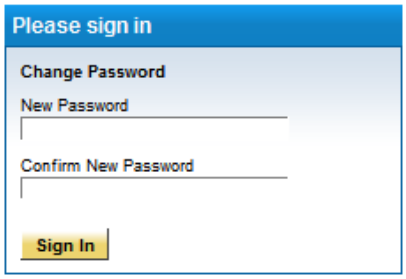
7. Type in the answer to the security question and hit **Submit**.



Next, the following notification will display:



When users receive a temporary password, they can use it to log into the MAT. Users will then be asked to submit a new password that conforms to the same requirements detailed above.



The next chapter describes how to navigate the MAT and provides steps on how to use the MAT to create an eMeasure.

V. APPLICATION TIMEOUT

Users will be automatically logged out of the Measure Authoring Tool after 60 minutes of inactivity. Users will receive the following warning message after 50 minutes of inactivity, which will prompt them to continue their Measure Authoring Tool session.

User computers that are inactive for more than 60 minutes, including those re-awakening from sleep mode, will note the MAT will refresh to display the login page. 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.

VI. TECHNICAL/ USER SUPPORT

In addition to this User Guide, other training and supporting documents are available to respond to inquiries and answer questions on the MAT. Please visit NQF's Measure Authoring Tool Page (http://www.qualityforum.org/MAT) for a tutorial demo on applying for a MAT account and on OIDs, a fact sheet, frequently asked questions and webinar recordings on the MAT. A technical help desk is available with live technical support at 1-800-673-0655 from 7:30 am-5:00 pm Central Time, Monday through Friday.

Tutorial (http://www.qualityforum.org/MAT)**:**

Demo on applying for a MAT account and OIDs
Fact sheet
Frequently asked questions
Webinar recordings on the MAT

Technical help desk with live technical support

1-800-673-0655
Time: 7:30 am-5:00 pm Central Time, Monday through Friday

Technical support will be closed on the following holidays:

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

Questions can be sent to MATsupport@qualityforum.org. Please refer to NQF's Health Information Technology website (http://www.qualityforum.org/Topics/Health_IT.aspx) for other resources, also listed in the Resources section in Chapter 4.

The Measure Authoring Tool (MAT) is available 24 hours a day, 7 days a week at https://mat.qualityforum.org. MAT users will be notified via e-mail about scheduled and unscheduled system maintenance days.

Scheduled Maintenance

Scheduled maintenance for the MAT occurs on the second weekend of each month from 1:00 a.m. Eastern Time (ET) on Saturday through 7:00 p.m. ET on Sunday. The MAT may not be available or will be limited during those times.

Additional Maintenance
A secondary maintenance window is reserved to begin at 8:00 pm ET on the second Tuesday of each month.

When accessing the MAT after a system maintenance day, please delete the browser history to prevent browser caching error. Instructions on how to delete your browser history in Internet Explorer and Firefox are below:

Internet Explorer 9

1. Click the **Tools** button  , point to **Safety**, and then click **Delete browsing history**. If you don't want to delete the cookies and files associated with websites in your favorites list, select the **Preserve Favorites website data** check box.

2. Select the check box next to each category of information you want to delete. For purposes of the Measure Authoring Tool, it is sufficient to only select History and unselect all other options

3. Click **Delete**.

Firefox

1. At the top of the Firefox window, click the Firefox button, go over to the History menu and select Clear Recent History….
   For Windows XP: At the top of the Firefox window, click the Tools menu and select Clear Recent History….

2. Select how much history you want to clear:
   a. Click the drop-down menu next to **Time range to clear** to choose how much of your history Firefox will clear. If you are not sure when you last logged in to the Measure Authoring Tool, select Everything.

3. Next, click the arrow next to **Details** to select exactly what information will get cleared. For purposes of the Measure Authoring Tool, it is sufficient to only select Browsing & Download History

4. Finally, click the Clear Now button and the window will close and the items you've selected will be cleared.

The User Guide will be updated with each new release of the MAT, based on user feedback. Comments on the Measure Authoring Tool can be submitted to MATNQF@qualityforum.org.

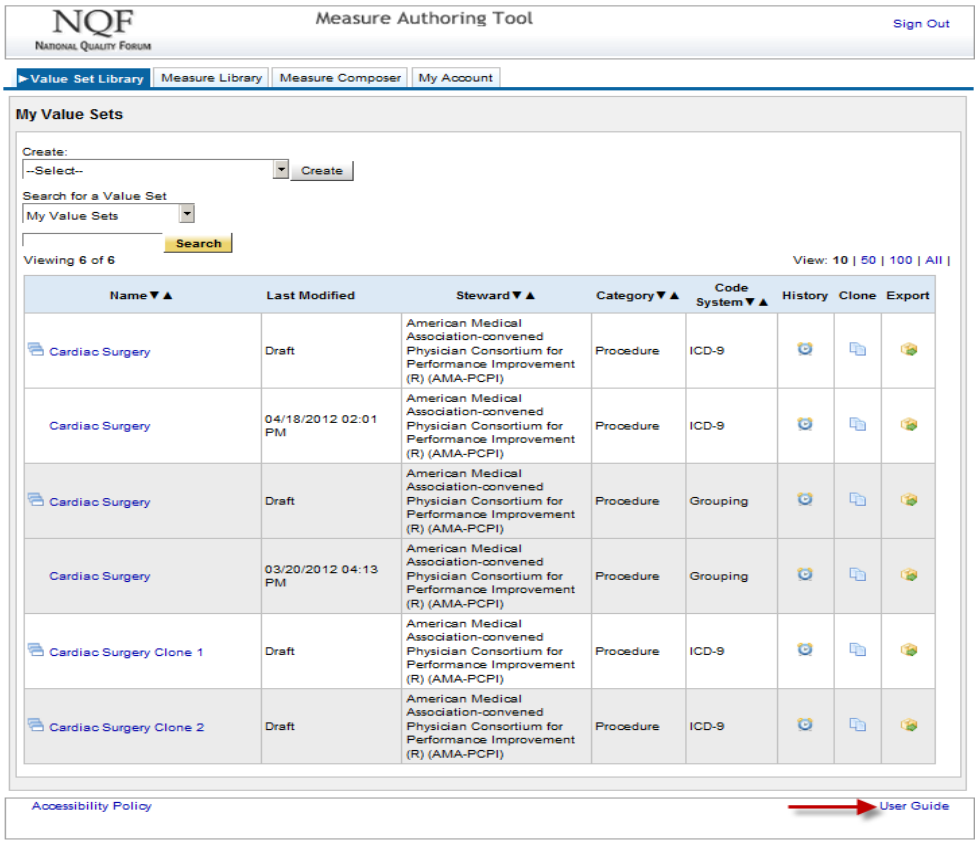
Chapter 4

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 tabs of the MAT, including the "Measure Library" tab, "Measure Composer" tab, and "My Account" tab are provided.*

I. HOW TO NAVIGATE THE MEASURE AUTHORING TOOL

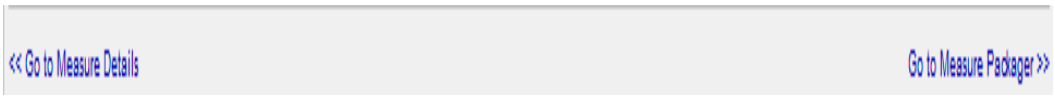
When users sign in to the Measure Authoring Tool (MAT), the following page will display.



Users can select one of four tabs, “Value Set Library,” “Measure Library,” “Measure Composer,” and “My Account” to navigate through the MAT. As displayed in the image above, selected tabs will display in blue, with bold text and a caret to the left of the tab.

The “Value Set Library” and the “Measure Library” displays a list of value sets and measures, respectively, that a user has access to in the MAT. The “Measure Composer” tab has three sub-tabs a user can navigate: “Measure Details,” “Clause Workspace,” and “Measure Packager.” The “My Account” tab has three sub-tabs: “Personal Information,” “Password,” and “Security Questions.”

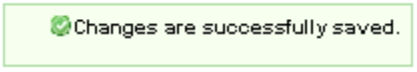
A user may click on the User Guide Link in the footer of the MAT to be directed to the MAT User Guide.



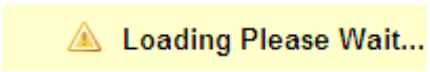
Users also can use the back and forward browser buttons to navigate to where they were previously in the MAT. Users also can refer to the links at the bottom of each page within the “Measure Composer” to help guide the measure creation process.

To save work in the “Measure Composer”, users can select the **Save** button located on the bottom left side of the screen.

Clicking the back button on the browser will not cancel any changes a user may have made. The “Clause Workspace” and “Measure Details” sub-tabs in the “Measure Composer” have an automatic save function when a user times out, closes out, or moves to a different sub-tab in the MAT. Users also can save changes to a measure in the MAT by using the keyboard shortcut of **Ctrl+Alt+s**. Upon successfully saving work, the user will see a confirmation message above the Save button and below the ‘Measure Set’ comment box.



While navigating between tabs in the MAT, the user may see a **Loading Please Wait** message between the NQF logo (top page) and tab ribbon while the data for each tab loads. Please wait for the page to finish loading before attempting to complete work on the screen. The loading is complete when both messages disappear.



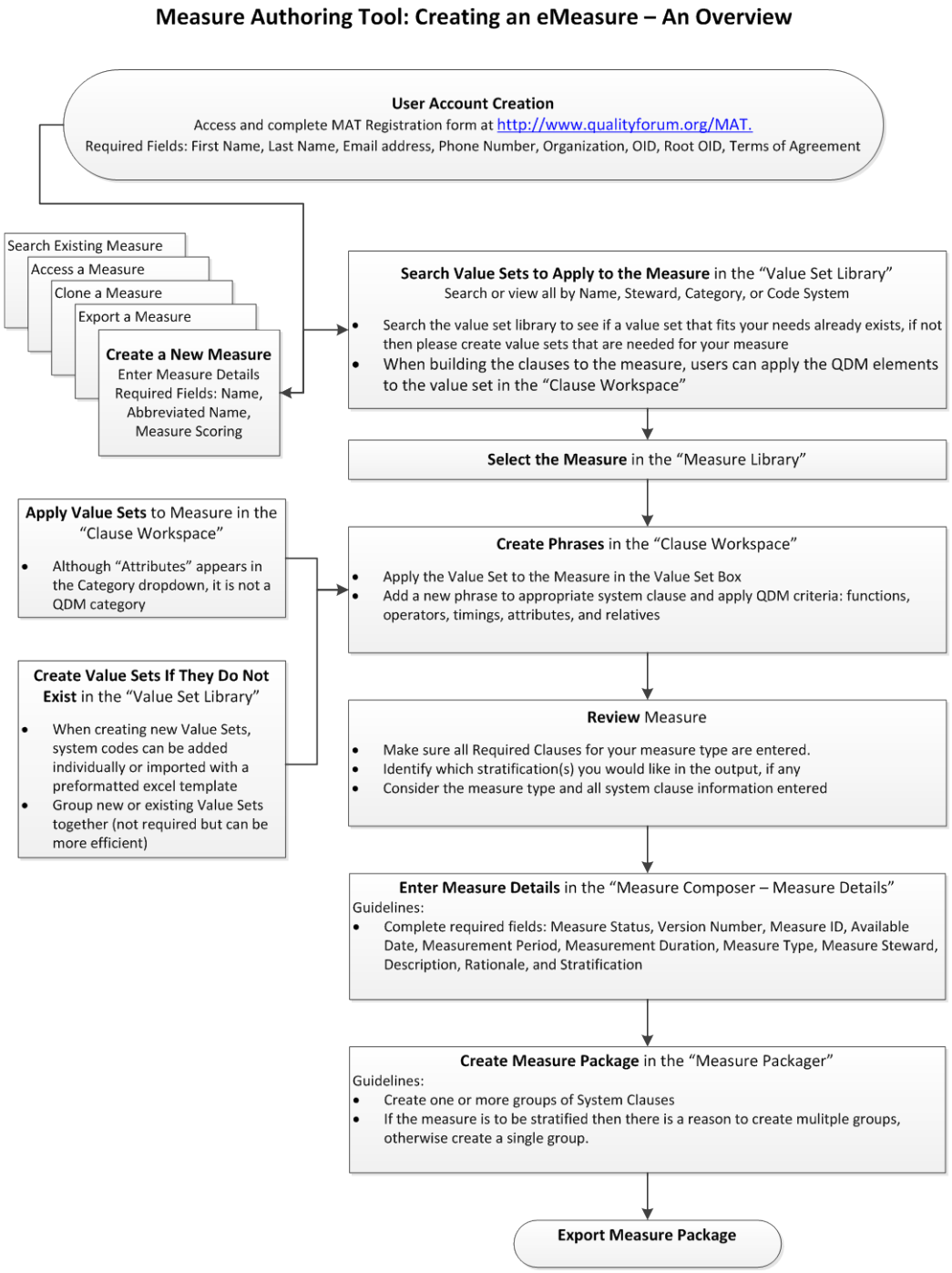
II. HOW TO CREATE AN eMeasure

The MAT workflow is designed so that users can create a measure in a sequential flow. The first tab, the "Value Set Library," allows users to view and access all value sets in the MAT. The "Measure Library" tab allows users to create a new measure or edit a measure that already exists. In the "Measure Composer", users can enter measure details, apply existing value sets, create the measure logic using the Quality Data Model (QDM), and export measures.

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 Measure Authoring Tool. The steps a user must take to build a measure are covered by providing examples of Oklahoma Foundation for Medical Quality's (OFMQ) measure NQF 0300 (endorsed by NQF), Cardiac Surgery Patients with Controlled 6A.M. Postoperative Blood Glucose.

Figure 1, below, is a Quick Start Guide and walks users through a step-by-step process to create an eMeasure from start to finish.

Figure 1. Quick Start Guide: Creating an eMeasure



III. RESOURCES

National Quality Forum, *ABCs of Measurement,* Washington, DC: National Quality Forum; 2011. Available at http://www.qualityforum.org/Measuring_Performance/ABCs/ABCs_of_Measurement.com.

National Quality Forum, *Consensus Standards Maintenance and Endorsement Cycle Process,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=36651.

National Quality Forum, *eMeasure Fact Sheet,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=69623.

National Quality Forum, *Guidance for Measure Harmonization,* Washington, DC: National Quality Forum; May 2011. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=62381.

National Quality Forum, *Guidance for Measure Testing and Evaluating Scientific Acceptability of Measure Properties,* Washington, DC: National Quality Forum; January 2011. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=59116.

National Quality Forum, *Measure Authoring Tool (MAT) Fact Sheet,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=68488.

National Quality Forum, *Measure Evaluation Criteria and Guidance Summary Tables Effective for Projects Beginning after January 2011- Reliability and Validity,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=66289.

National Quality Forum, *Measure Evaluation Criteria and Guidance Summary Tables Effective for Projects Beginning after January 2011- Usability,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=66290.

National Quality Forum; 2011. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=68545.

National Quality Forum, *Quality Data Model Fact Sheet,* Washington, DC: National Quality Forum. Available at http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=68921.

Chapter 5

Chapter 5: My Account

Chapter Overview:

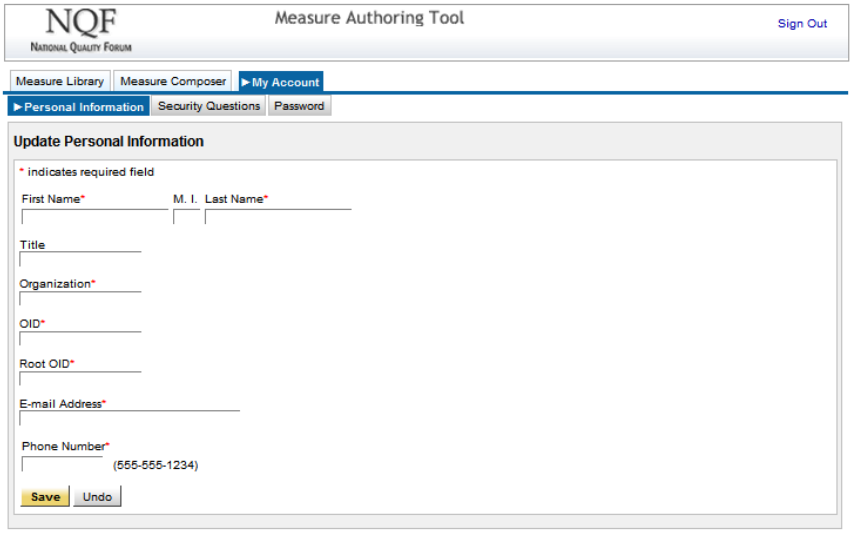
This chapter explains the features of the user's account details captured in the MAT and helps users maintain personal information and manage passwords. This chapter explains MAT functions related to managing personal account information and user passwords.

Measure Authoring Tool (MAT) users can edit their account details at any time. The "My Account" tab contains three sub-tabs: "Personal Information," "Security Questions," and "Password." The following sections will introduce each of the sub-tabs and associated information the MAT captures.

I. PERSONAL INFORMATION

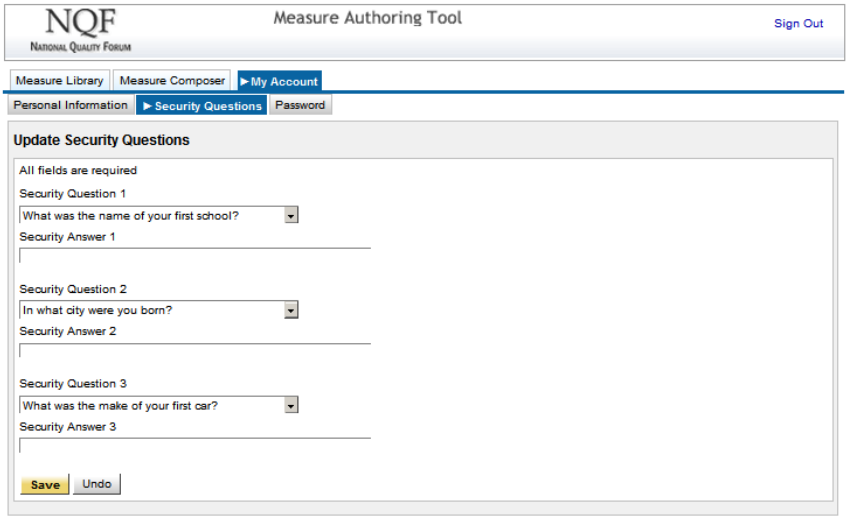
The Personal Information sub-tab contains information entered when the original account was created. Here, users can update their **Name**, **Title**, **Organization**, **Object Identifier (OID)**, **Root OID**, **E-Mail Address** (User ID), and **Phone Number**.

- ***Note:*** *When a user's e-mail address is changed, his or her user ID is also updated.*



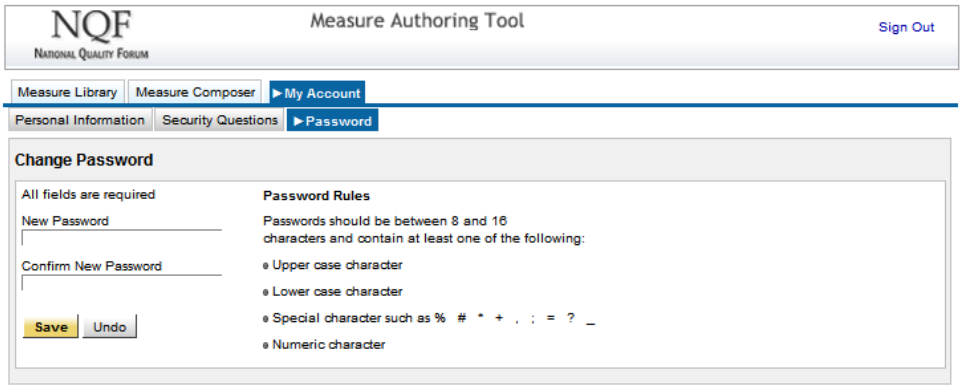
II. SECURITY QUESTIONS

Users are required to select three unique security questions and provide answers to those security questions. Answers may not be duplicated. Upon successful log-in, users can change questions and answers at any time. Users will be prompted to answer one of the three security questions when they select the **Forgot Your Password** link on the sign-in page.



III. PASSWORD

Users can manage and update their password by entering and confirming a new password that meets the password rules designated on the right-hand side of the screen.



Chapter 6

Chapter 6: Value Set Library

> **Chapter Overview:**
>
> *This chapter describes how to create and manage value sets and grouped value sets. Users will learn to identify the standard category of the Quality Data Model (QDM) element, specify the code set used, and manage the corresponding codes that comprise their clinical concept value sets.*

A value set is a set of values that contain specific codes derived from a particular code system (or vocabulary, e.g., ICD-10, ICD-9, SNOMED CT, LOINC, and CPT). Value sets are used to define an instance of any given Quality Data Model (QDM) category of information. It is the value set that specifies the actual data element used in the measure. The Health Information Technology Standards Committee (HITSC) Vocabulary Task Force and Clinical Quality Workgroups identified the specific code system for use with each QDM category of information.[9] The Measure Authoring Tool (MAT) provides the user with the ability to enter value sets created from the approved code system (See Appendix B).

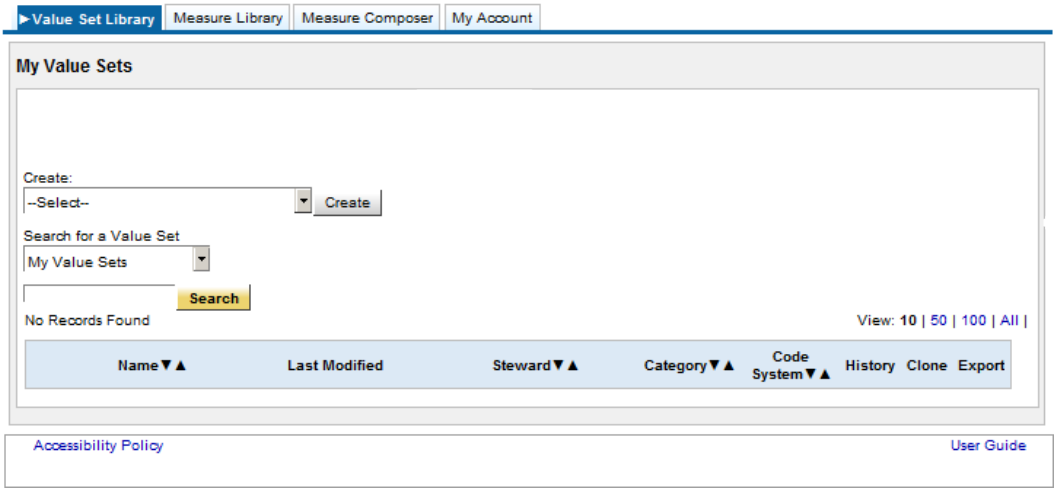
Measure developers have access to all value sets in the MAT. In the "Value Set Library," a user will see all versions, including draft and saved versions of a Value Set. Users can filter which value sets to display in the "Value Set Library" and choose to see their own value sets, all value sets, or just those value sets they have used previously. When a user exports a measure, the value sets are exported in the value set spreadsheet. The value set export spreadsheet contains the codes and descriptors for each value set used within a measure's logic.

I. SEARCH VALUE SETS

A. Viewing Value Sets

[9] U.S. Department of Health and Human Services (HHS),HIT Standards Committee: Recommendations to the National Coordinator for Health IT, September 9, 2011 Transmittal Letter Washington, DC: HHS; 2011. Available at http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_recommendations/1818

1. Select the drop down box on the left-hand corner of the “Value Set Library” tab.

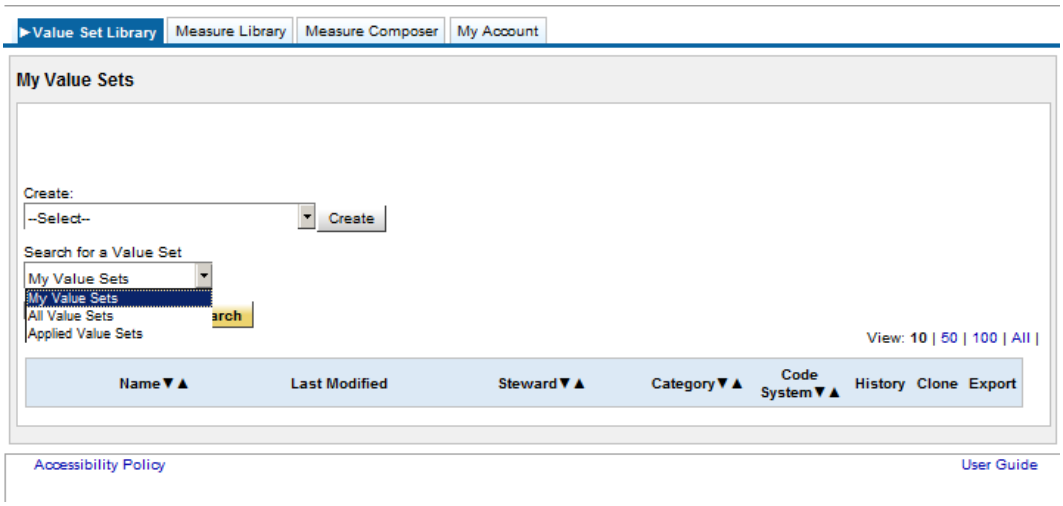


2. Select a preferred filter. The filter will default to **My Value Sets**.

   a. **My Value Sets**: The My Value Sets filter displays saved and draft versions of all value sets created by the signed-in user.
      - For draft value sets created by the signed-in user, all fields except Category and Last Modified can be edited. Once the value set is saved as complete, the user can edit the Last Modified fields. The Last Modified field can only be edited by the value set creator.

   b. **All Value Sets**: The All Value Sets filter displays saved and draft versions of all values sets, created by the signed in user as well as value sets created by other users.
      - For draft value sets created by the signed-in user, all fields except Category and Last Modified can be edited. Once the value set is saved as complete, the user can edit the Last Modified fields. The Last Modified field can only be edited by the value set creator.
      - Users will not be able to edit saved or draft versions of value sets created by other users.

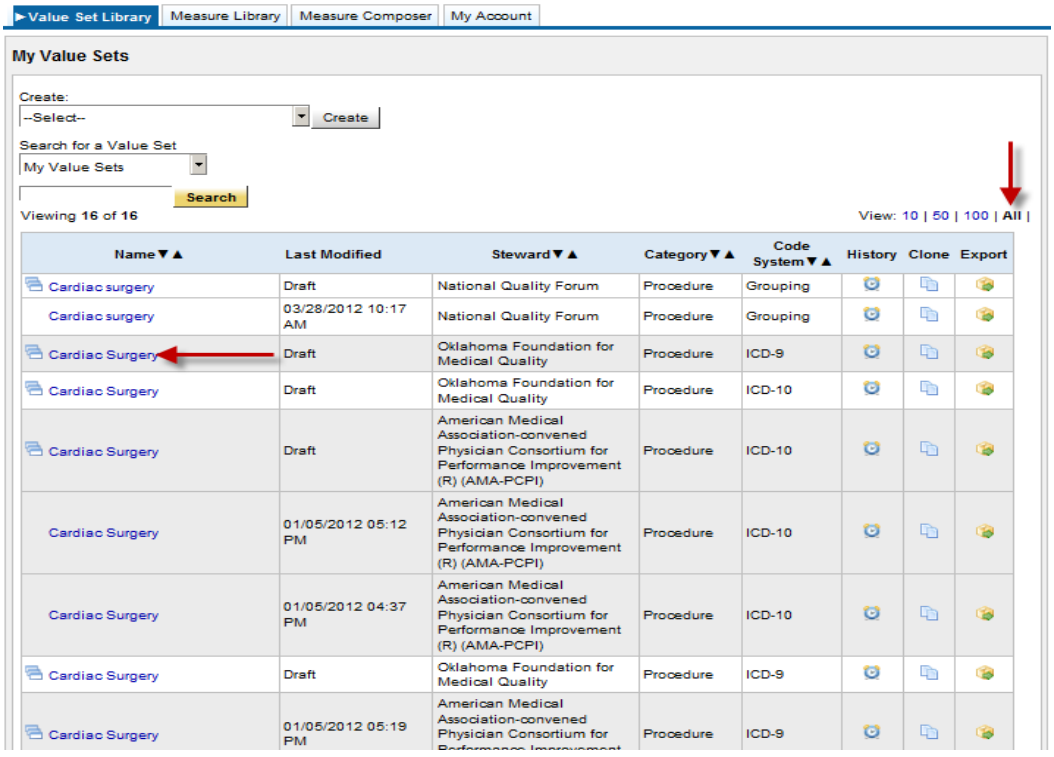
   c. **Applied Value Sets**: The Applied Value Sets filter displays only the saved and drafts versions of value sets for which the signed in user has used to create a QDM element, regardless of the value set creator.
      - For draft value sets created by the signed-in user, all fields except Category and Last Modified can be edited. Once the value set is saved as complete, the user can edit the Last Modified fields. The Last Modified field can only be edited by the value set creator.
      - Users will not be able to edit saved or draft versions of value sets created by other users.



3. Click the **Search** button.

4. Select the amount of value sets to display on the screen: **10**, **50**, **100**, or **All**. This selection can be made on the upper right-hand corner of the "Value Set Library." This feature allows the user to filter the number of value sets displayed.

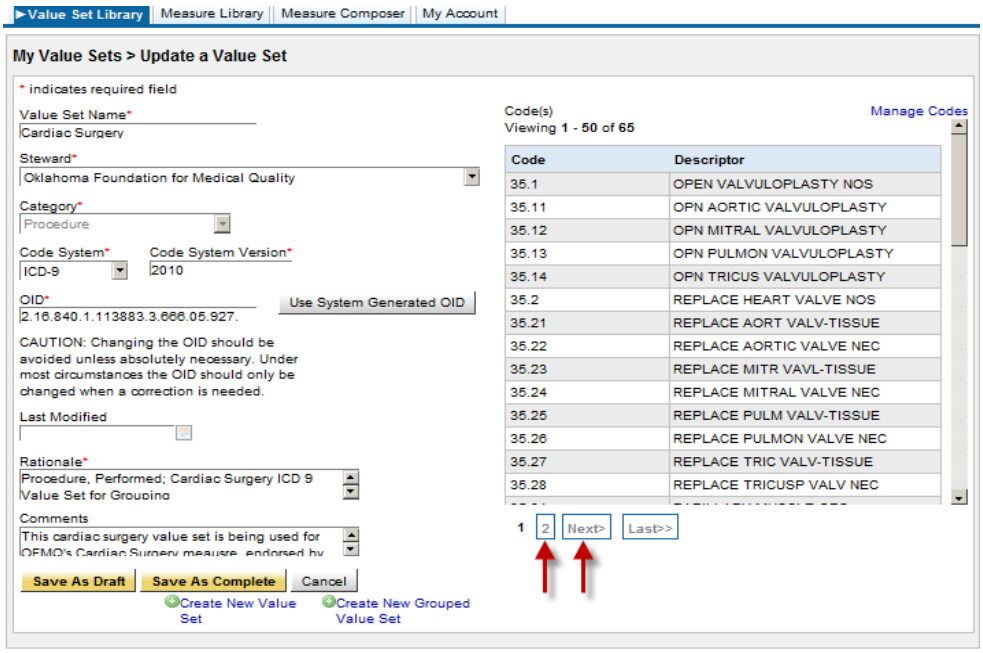
To view the details of the value set, click on the **Name** of the value set.



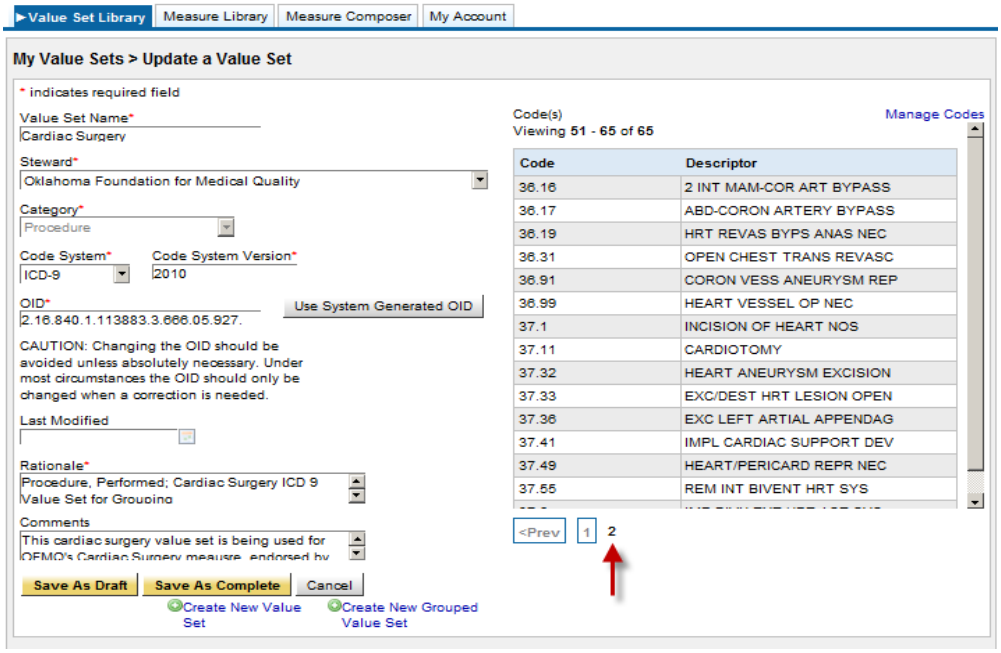
The details of the value set, including the individual codes and code descriptors, will display. To understand the differences between a draft version and saved version of a value set, select the most recent version's history icon. Clicking on the most recent

version's history icon will display a log entry with a date and time stamp for both the saved and draft value sets.

Value set owners may also enter comments in the comments or rationale fields. To review these comments select the value set name to display the value set detail screen.



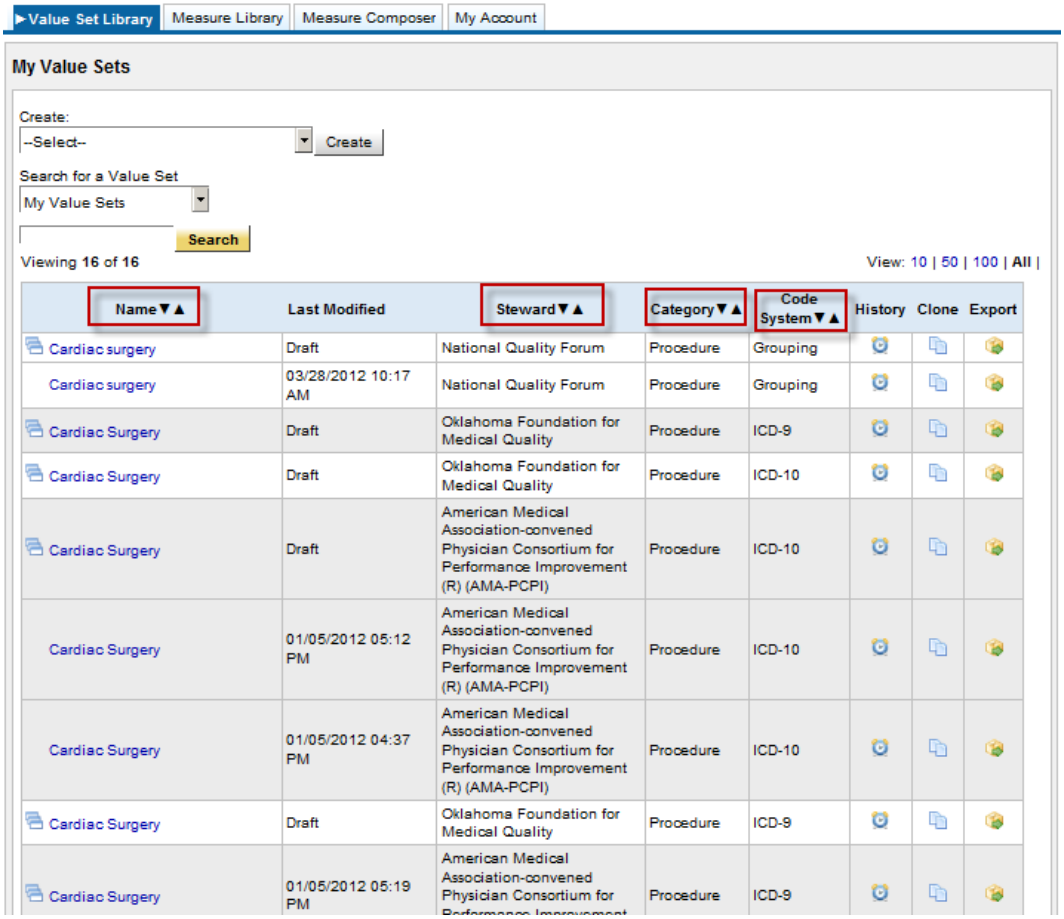
Only 50 codes will display at a time in the Code and Descriptor columns on the right side of the page. To view more, select the **Next** page, or the page number just underneath the list of codes on the right-hand side of the screen.



B. Sorting Value Sets

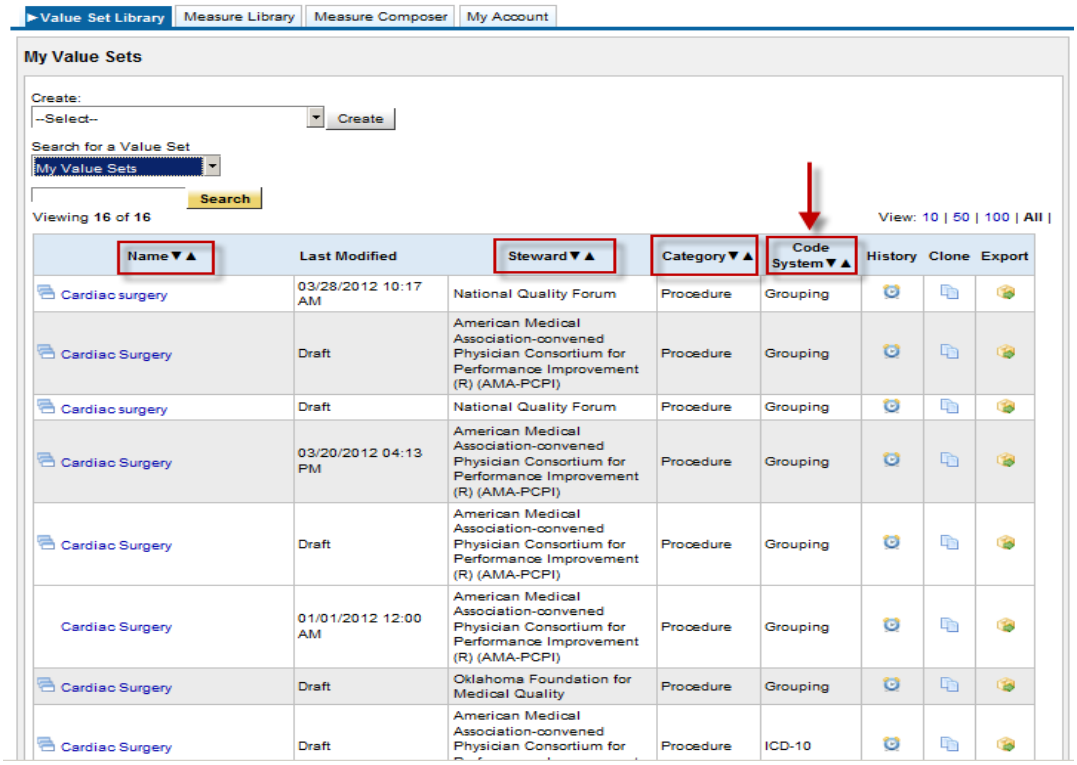
Value sets can be sorted by clicking on the sort arrows at the top of the column headers. Value sets can be sorted by value set **Name**, **Steward**, **Category**, or **Code System**.

The image below provides an image of the "Value Set Library" sorted by value set name.



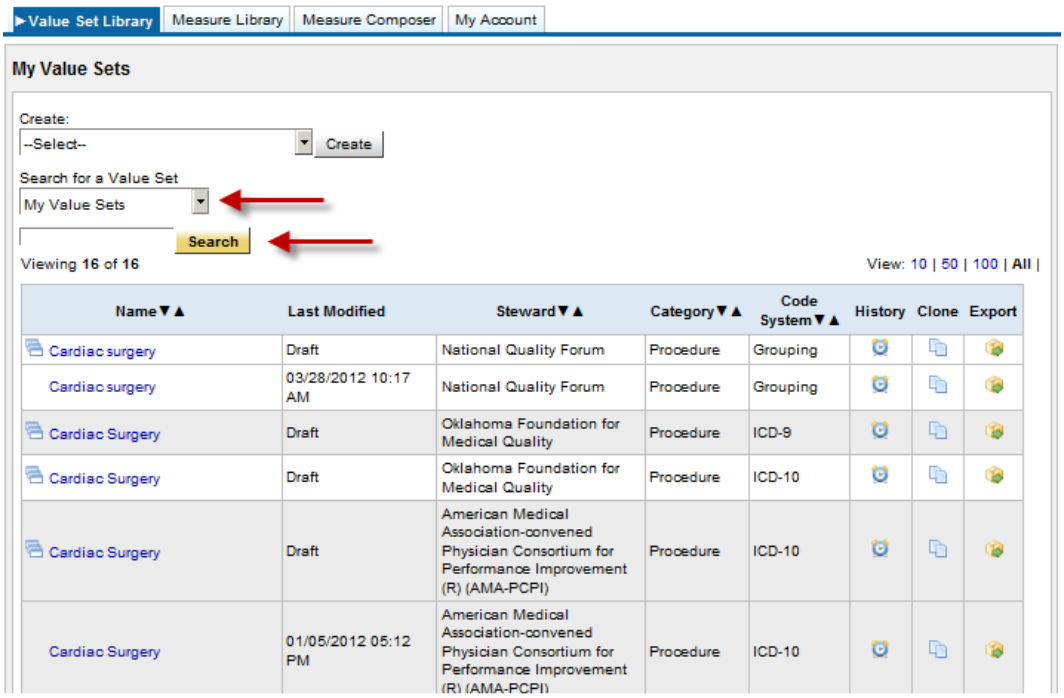
Name ▼▲	Last Modified	Steward ▼▲	Category ▼▲	Code System ▼▲	History	Clone	Export
Cardiac surgery	Draft	National Quality Forum	Procedure	Grouping			
Cardiac surgery	03/28/2012 10:17 AM	National Quality Forum	Procedure	Grouping			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-9			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-10			
Cardiac Surgery	Draft	American Medical Association-convened Physician Consortium for Performance Improvement (R) (AMA-PCPI)	Procedure	ICD-10			
Cardiac Surgery	01/05/2012 05:12 PM	American Medical Association-convened Physician Consortium for Performance Improvement (R) (AMA-PCPI)	Procedure	ICD-10			
Cardiac Surgery	01/05/2012 04:37 PM	American Medical Association-convened Physician Consortium for Performance Improvement (R) (AMA-PCPI)	Procedure	ICD-10			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-9			
Cardiac Surgery	01/05/2012 05:19 PM	American Medical Association-convened Physician Consortium for	Procedure	ICD-9			

The image below provides an image of the "Value Set Library" sorted by code system.



C. Searching Value Sets

1. Select the value set to perform the search: **My Value Sets**, **All Value Sets**, or **Applied Value Sets** in the **Search for a Value Set** dropdown.

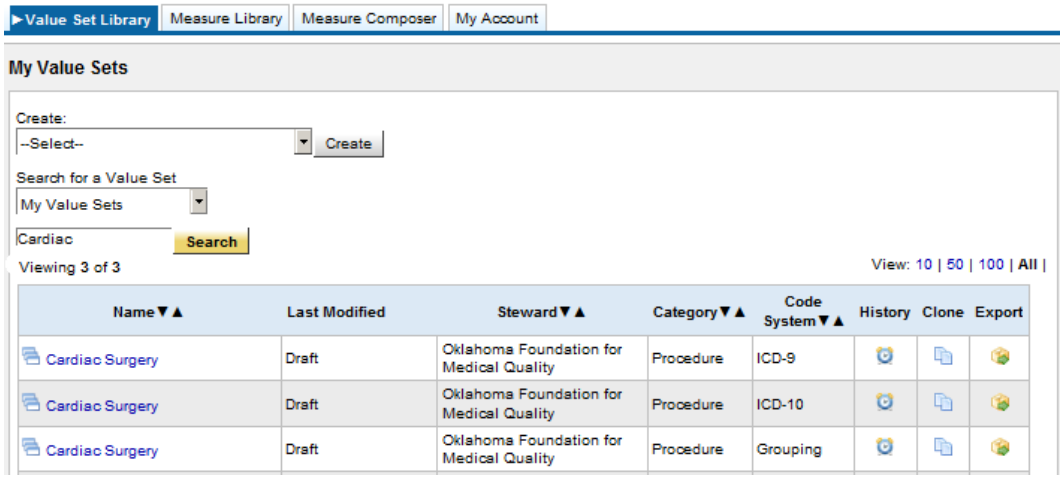


2. In the next field, enter keywords or partial text in the search box on the upper left portion of the screen.

3. Click **Search**.

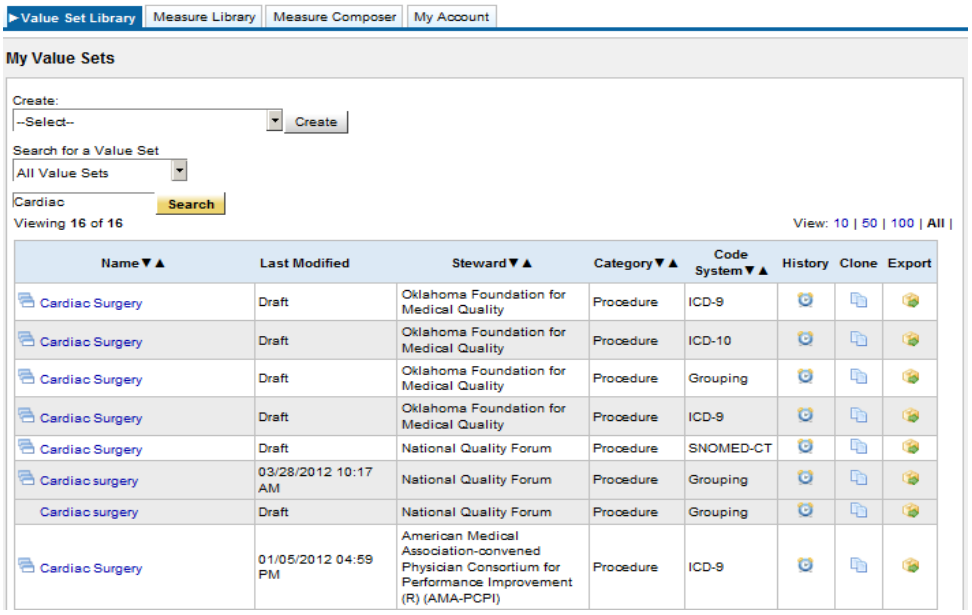
The search will return results that contain the keyword from the following fields: value set Name, Steward, Code System, Code, or Code Descriptor.

*Example. When the word 'cardiac' is searched with the **My Value Sets** filter, the following instances of the keyword are found.*



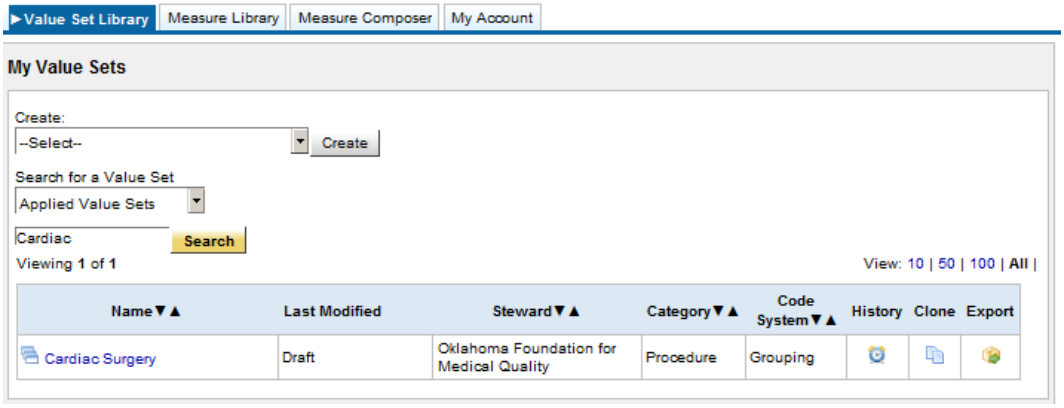
Name	Last Modified	Steward	Category	Code System	History	Clone	Export
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-9			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-10			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	Grouping			

*Example. When the word 'cardiac' is searched with the **All Value Sets filter**, the following instances of the keyword are found. Please note additional value sets has been identified. Since the additional value sets were created by another author it did not display in the **My Value Sets** filter.*



Name	Last Modified	Steward	Category	Code System	History	Clone	Export
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-9			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-10			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	Grouping			
Cardiac Surgery	Draft	Oklahoma Foundation for Medical Quality	Procedure	ICD-9			
Cardiac Surgery	Draft	National Quality Forum	Procedure	SNOMED-CT			
Cardiac surgery	03/28/2012 10:17 AM	National Quality Forum	Procedure	Grouping			
Cardiac surgery	Draft	National Quality Forum	Procedure	Grouping			
Cardiac Surgery	01/05/2012 04:59 PM	American Medical Association-convened Physician Consortium for Performance Improvement (R) (AMA-PCPI)	Procedure	ICD-9			

*Example. When the word 'cardiac' is searched with the **Applied Value Sets filter**, the following instances of the keyword are found. Please note, only the value set grouping, which a user has applied to their measure, is listed. This result is because only the Grouping has been applied directly to a measure in the MAT. The other value sets are included in the Grouping but each is not individually applied to a measure.*

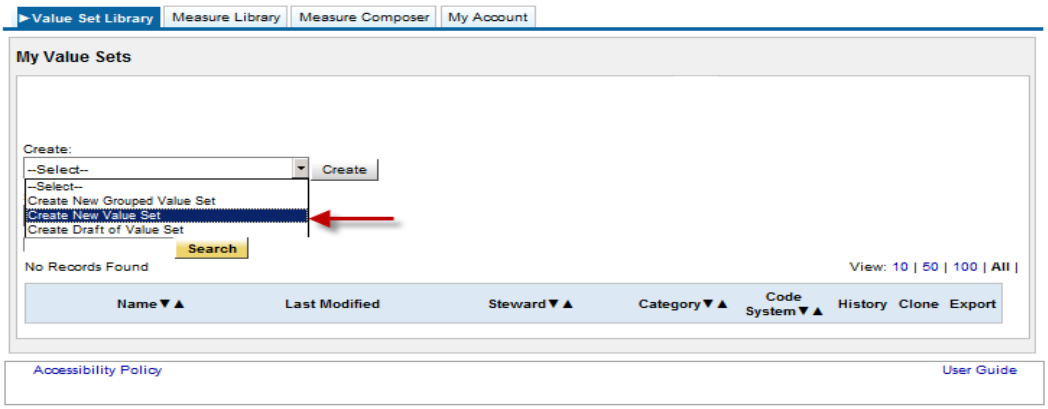


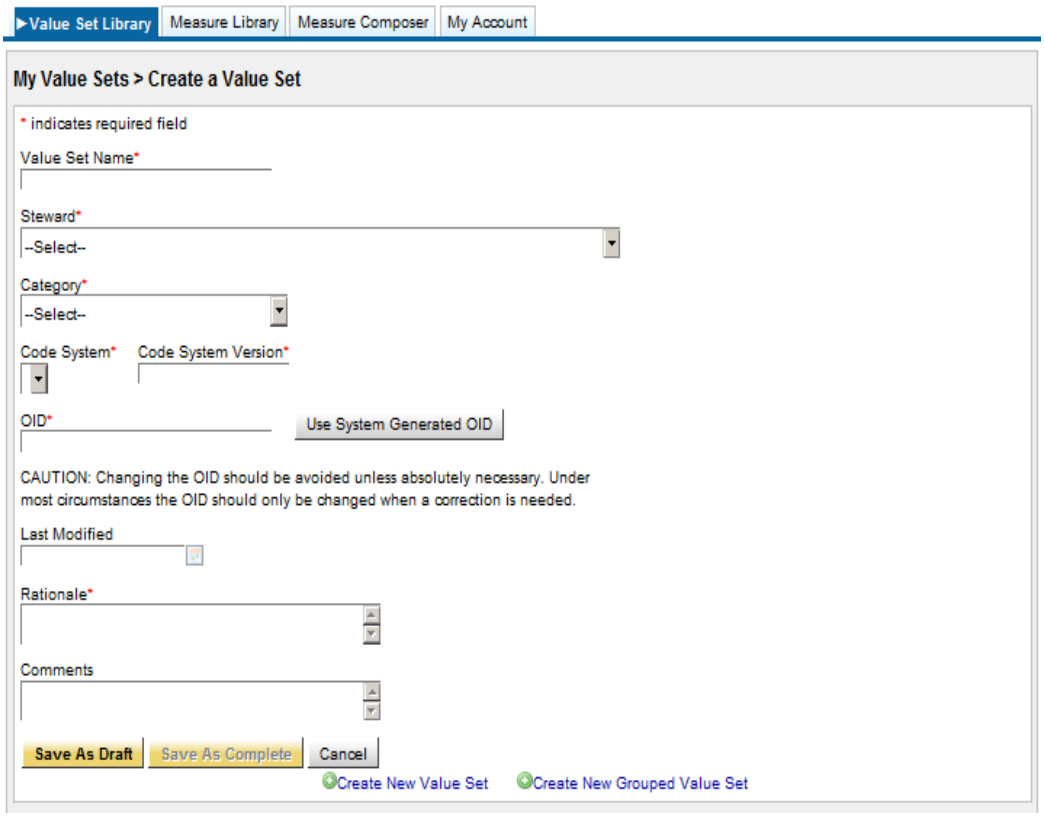
II. CREATE VALUE SETS

> ***Note:***
> - *Before creating a value set, it is best practice to check if a value set that meets your measure's needs already exists.*
> - *Please keep in mind, value set OIDs cannot be entered into the MAT if they already exist.*
> - *Go here, for instructions on how to search value sets in the MAT.*

The following steps must be completed to create a value set:

1. Select the **Create New Value Set** option in the Create drop down menu. Users will be directed to a new page to enter information about the value set.





2. Enter a name for the value set in the **Value Set Name** field.

> - ***Note:*** *Measures sometimes require similar value sets. For this reason, a descriptive value set name is highly recommended.*

Example. For measure NQF 0300 the value set for the inpatient hospital encounter, one possible name for the value set is Inpatient Hospital. It is suggested that the QDM category not be included in the Value Set Name, since the QDM Category is automatically applied by the MAT when the value set is applied to the measure.

3. Select a **Steward** from the list of available options or select **Other** to enter a value set steward. The **Steward** is the organization that is developing and plans to manage and maintain the value set over time. The organization selected for this field will display as the Value Set Developer in the Measure Value Set Export. The value set steward may be different from the measure steward.

    a. If users select **Other**, they must enter a value in the **User Defined Steward** field.

*Example. For measure NQF 0300's inpatient hospital encounter value set, the value set **Steward** is the American Medical Association.*

4. Select a **QDM Category**. Once a user selects a category and the value set is saved, this field cannot be modified. Please make sure the right category is chosen before selecting Save. The category selection is important because it guides the use of the value set only for appropriate data elements.

*Example. For measure NQF 0300's inpatient hospital encounter value set, the **QDM Category** is Encounter.*

- ***Note:** While Attribute appears under the **QDM Category** drop-down menu, it does not act like other QDM categories. Specifically, when a value set is assigned to an Attribute, users are making the Attribute available to their measure, similar to how QDM elements are made available to a measure. The Attributes can then be applied to the QDM elements.*

5. Select a **Code System**. The **Code System** field is filtered based on the category selected. A user can select only the approved code systems for each of the QDM categories. Refer to the QDM Component Matrix in Appendix B for a list of the allowable and recommended code systems for each QDM category.

*Example. For measure NQF 0300's inpatient hospital encounter value set, the **Code System** is SNOMED-CT.*

6. Enter the **Code System Version**. This is a free-text field allowing users to enter the **Code System Version** based on the **Code System** the user has selected.

*Example. For measure NQF 0300's inpatient hospital encounter value set, the **Code System Version** is 2010.*

- ***Note:** A helpful hint displays over the Code System Version field to explain the field's purpose. This hint includes the following text: "The version of the code system used to define a value set. The format (ex.: version number or year) will vary based upon the code system selected."*

7. Enter the value set OID in the **OID** field if it already has a unique identifier (OID), or click the **Use System-Generated OID** button to have the MAT automatically assign an OID to the value set. Refer to https://www.qualityforum.org/MAT for more information about OIDs. The Value Set OID will persist across all iterations of the value set.

    a. The **Use-System Generated OID** option will result in an OID that uniquely identifies the value set the user creates. To create the value set OID, the MAT will append a unique identifier to the user's root OID supplied when the user account was created.

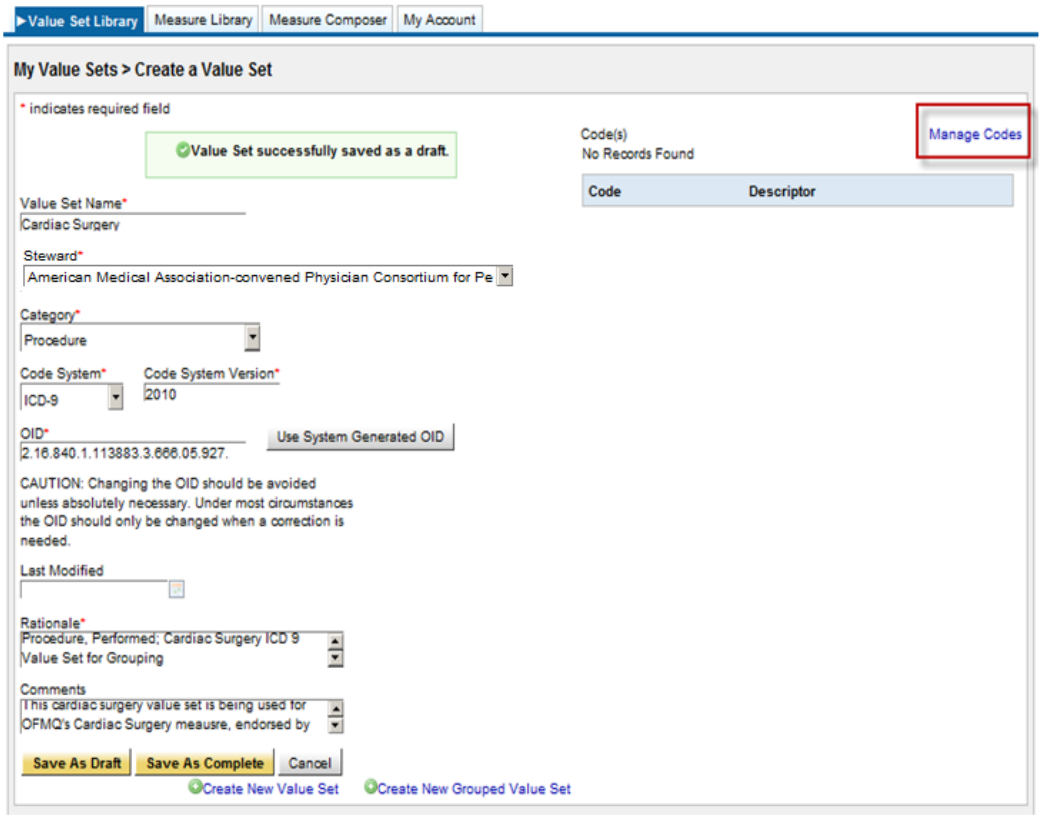
*Example. For measure NQF 0300's inpatient hospital encounter value set, the **OID** is 2.16.840.1.113883.3.666.5.625.*

- ***Note:** The value set entry requires that value sets have a unique identifier. If the user has created the value set or obtained it from another source and it already has a unique identifier (OID), enter the OID in the respective field (user-generated OID). If an identifier does not exist for the value set, the MAT will assign one (system-generated OID). A helpful hint displays over the OID field to explain the difference between a user-generated OID and a system-generated OID. The hint includes the following text: "Select Use System-Generated OID to have the system assign an OID to the value set. If an OID has been assigned to the value set outside of the Measure Authoring Tool, manually enter the OID." Note: Most code sets (vocabularies) also have unique identifiers (OIDs). There is no field currently in the MAT to enter the OID for the code set.*

8. Enter the rationale for the value set in the **Rationale** field. This is a required field because it describes the intended use of the value set.

9. Users can enter comments in the **Comments** field. This is an optional field.

10. Click **Save As Draft** or **Save As Complete**. The **Save As Draft** function will allow a user to update the value set at a later time. The **Save As Complete** function does not allow any future updates. A save successful message will display if the value set successfully saved. Users will then see a manage codes box on the right-hand side of the screen.

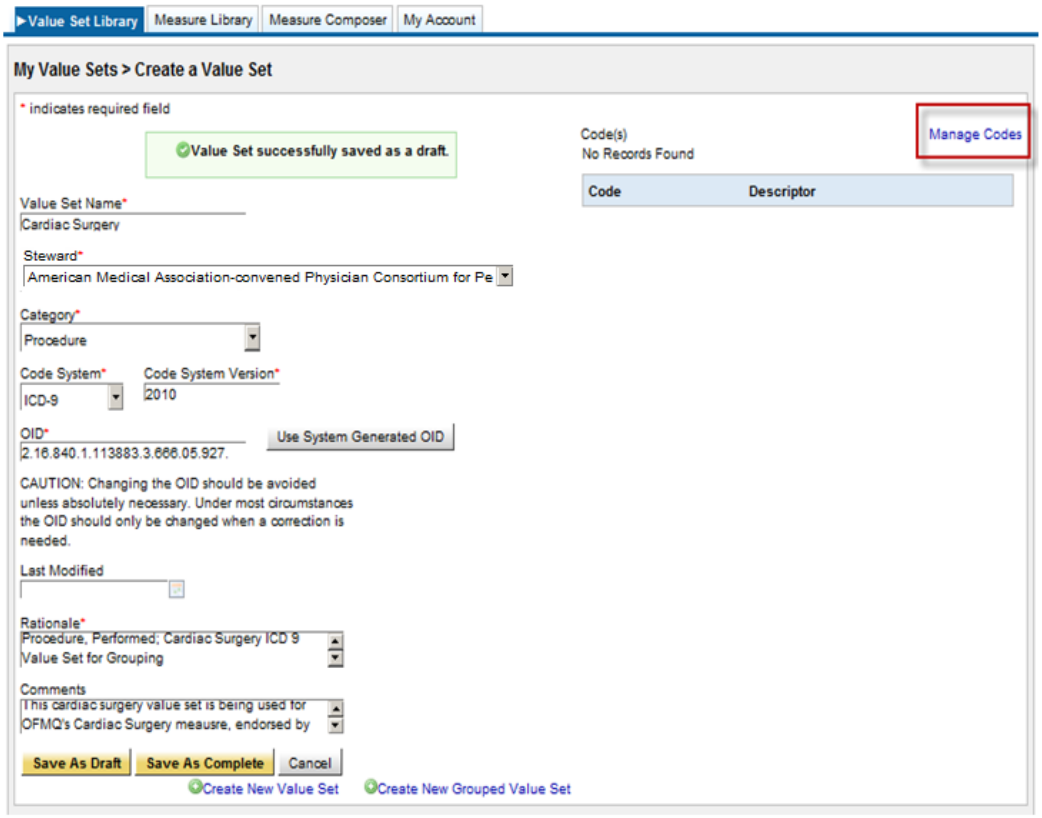


Navigation Tip: For step-by-step instructions on how to apply the attribute value set to the measure, go to page 117. After applying the attribute value set to the measure, instructions for adding the attribute to the QDM element can be found in the Build Measure Phrases section in Chapter 9: Measure Composer—Clause Workspace.

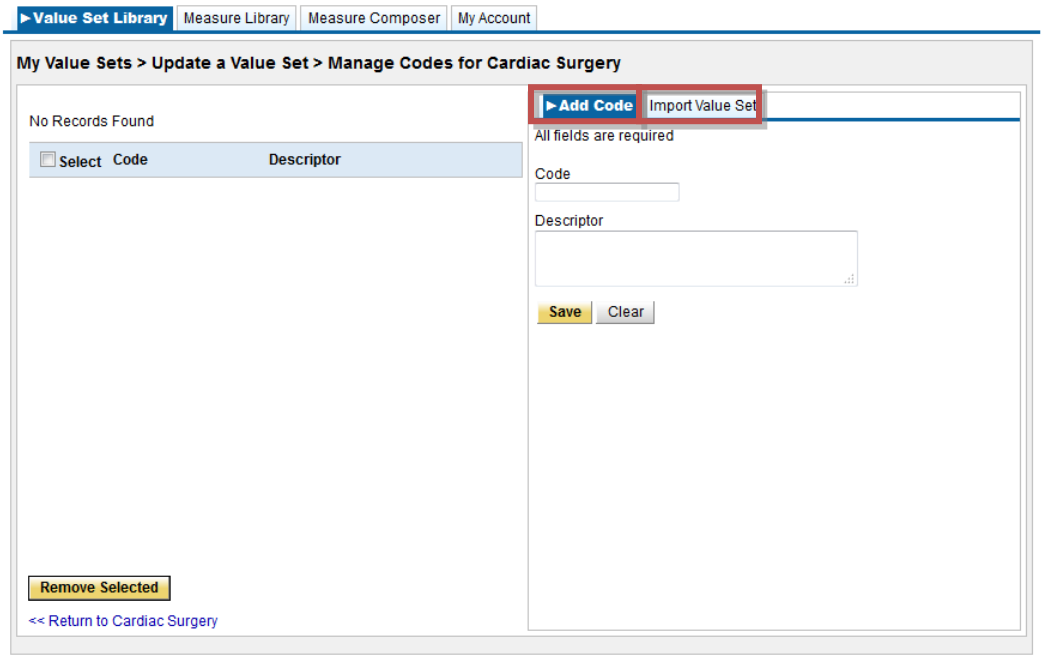
A. Manage Value Set Codes and Code Descriptors

To add codes and associated code descriptors, follow the steps listed below:

1. Select the **Manage Codes** link.



2. Two options are available for adding codes and code descriptors to a value set. Users can manually add value sets by selecting the **Add Code** tab or upload or import Excel value sets by selecting the **Import Value Set** tab. When many codes are affiliated with a value set, it is more efficient to upload or import an Excel file with the codes.



Navigation Tip: Users may choose to create grouped value sets. To learn the steps to create grouped value sets go to page 53 in this chapter. After creating value sets, users can continue to build the measure by applying QDM elements to the value sets in the Clause Workspace sub-tab. Step-by-step instructions are provided in the value set box section labeled Create a QDM Element for the Measure on page 118 in Chapter 9: Measure Composer—Clause Workspace.

B. Manually Add Value Sets

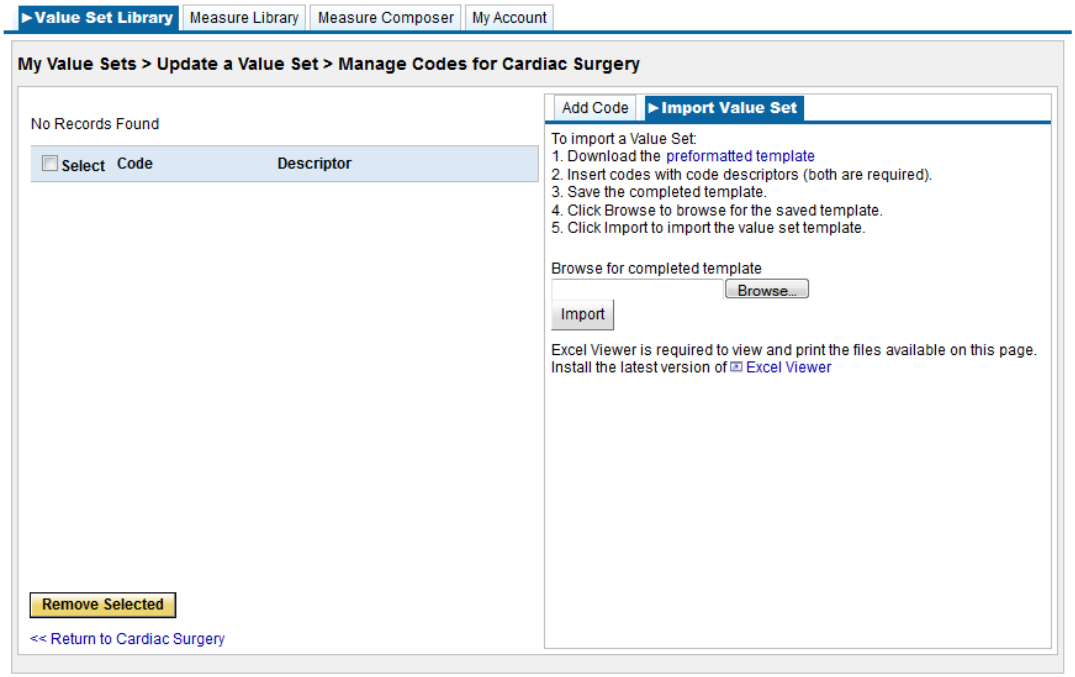
a. Users can manually add code and code descriptors to the value set on the **Add Code** tab.

i. Enter the **Code** and **Descriptor** for the code and click Save.

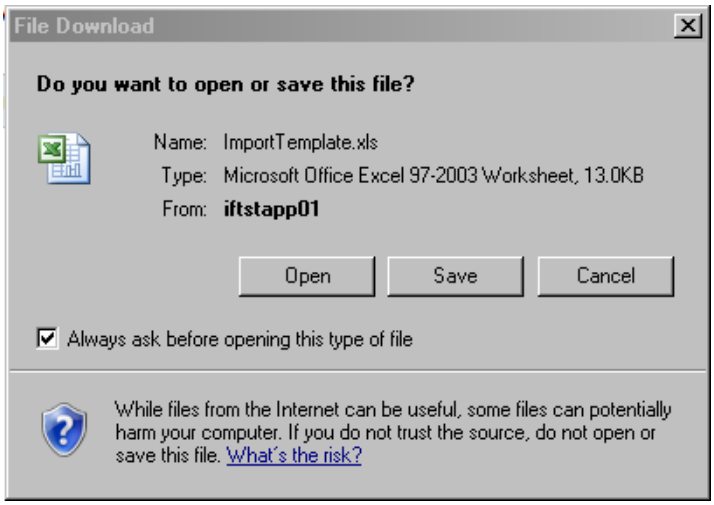
ii. A "Save Successful" message will display when the user has saved changes successfully.

C. Import Value Sets

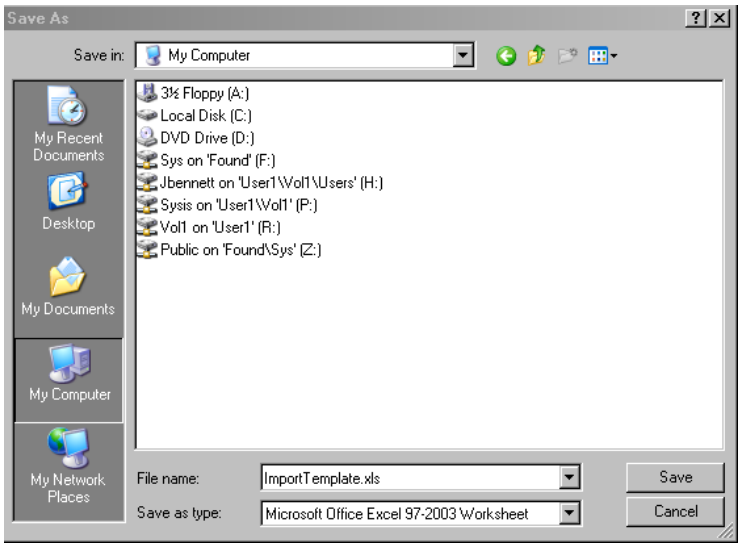
Users can also import code and code descriptors into a value set through **the Import Value Set** tab. To import a value set:



i. Click on the **Preformatted Template** link. **A File Download** box displays.

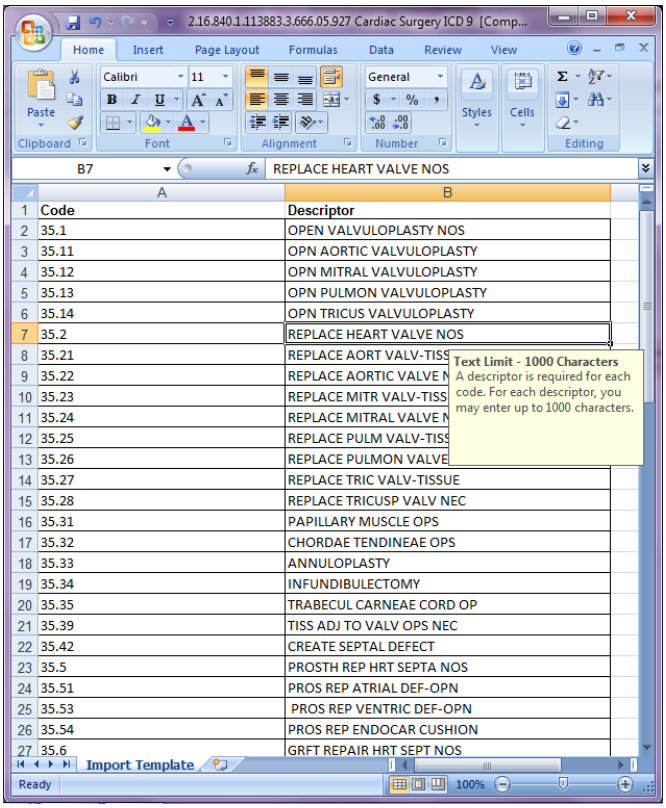


ii. Navigate to the correct directory to save the template and click **Save**. Be sure to make note of where the template has been saved.



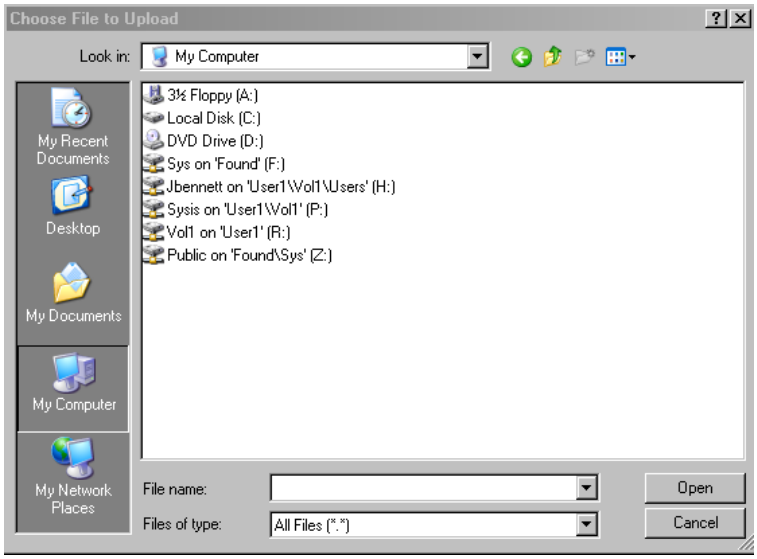
- ***Note:*** *Both .xls and .xlsx file extensions are acceptable.*

iii. Access the template at the location where the user saved the file, and enter the codes and descriptors for the value set to import. Both codes and descriptors are required.



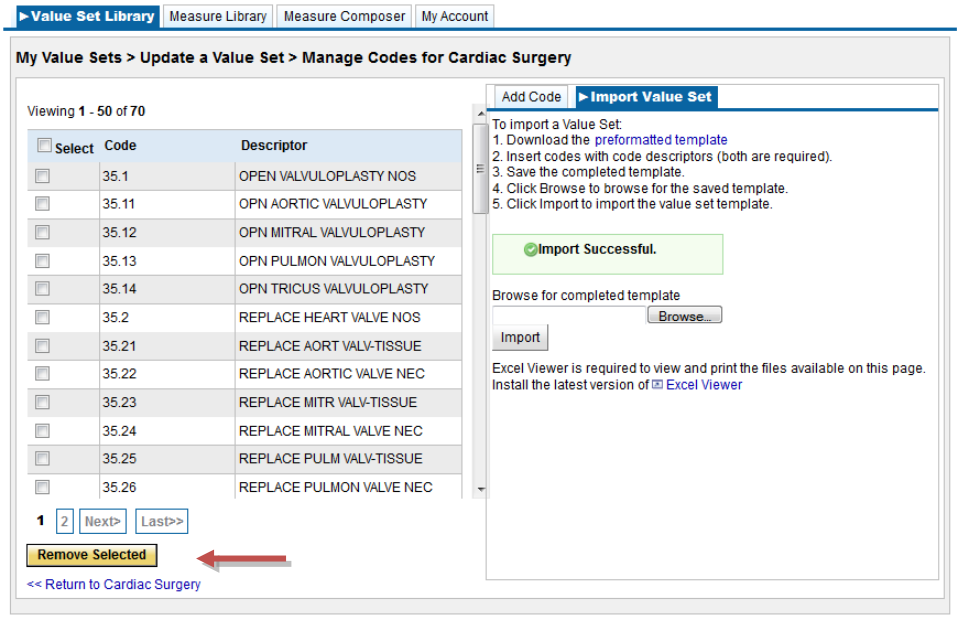
iv. Save the completed template by clicking **Save**.

v. Click **Browse** to search for the completed template. A **Choose File to Upload** box will appear.

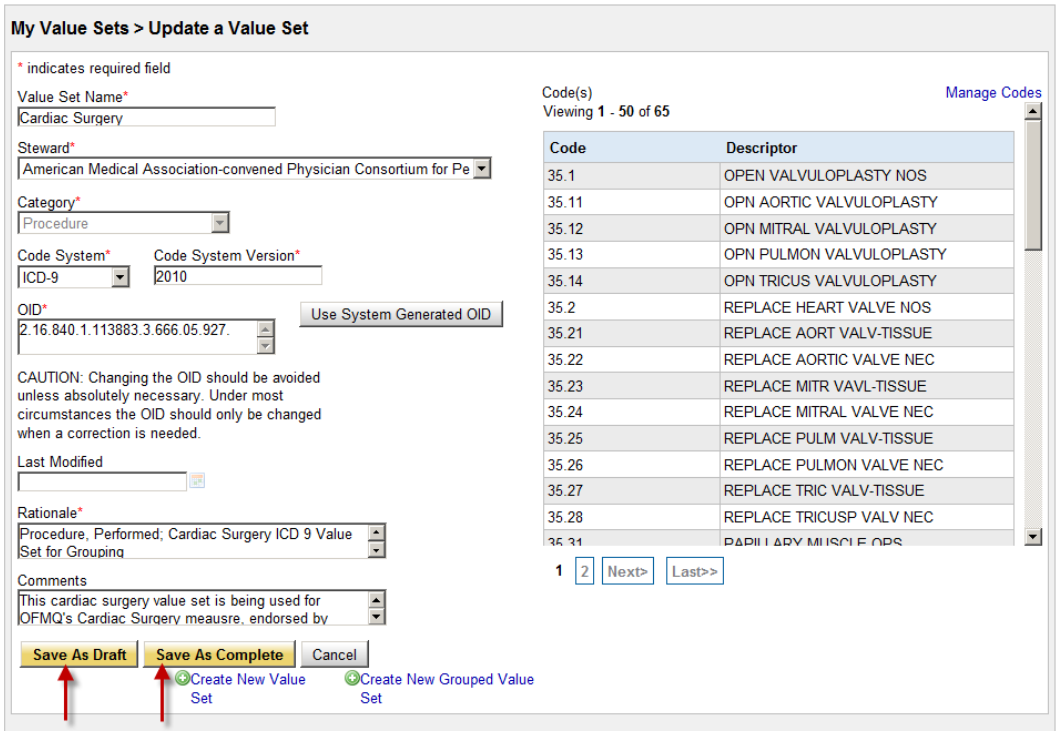


vi. Navigate to the location where the completed template has been saved. Click **Open**. The template location displays in the **Browse** field.

vii. Click **Import**. An "Import Successful" message displays.



viii. Select the **Return to Measure Name** link on the bottom of the page to view imported codes.



ix. Select the **Save As Draft** or **Save As Complete** buttons to save the value set.

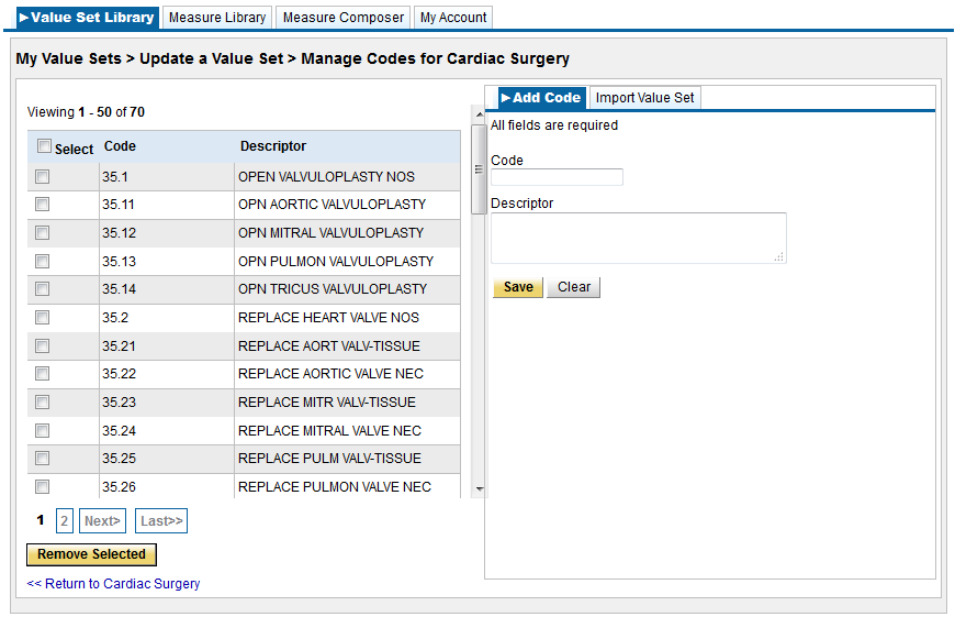
> • ***Note:*** *The Measure Authoring Tool prevents users from entering duplicate codes within the same value set.*

The MAT checks for codes within the import for duplication with codes previously added. If there is a duplication of codes, the user receives the following message: "Import successful. (Specific codes) codes were identified as duplicates to codes already in the value set and were ignored upon import."

D. Remove Codes from Value Sets

Users may remove codes by following the instructions below:

1. Select the **Value Set Name** you would like to remove a code from.
2. Select the **Manage Codes** link.
3. Select the box next to the codes so that a check mark appears.
4. Select **Remove Selected**. Users can enter check marks one at a time or by using the select all option next to the select label.



5. Once all codes have been added, select **Return to Value Set Name** link to save the changes.

E. Code System Resource Links

The following links can be used to access code systems that can be used as a reference when managing codes within a value set. These code systems are owned by non-NQF constituents and may be subject to copyright or other intellectual property restrictions. Using these codes may require permission from the code owner or licensure. It is the user's responsibility to fulfill requirements imposed by the code owner. Use of the MAT does not confer any rights on code use to the user.

SNOMED CT: http://www.nlm.nih.gov/research/umls/Snomed/snomed_main.html

LOINC: http://loinc.org/

ICD9/10: http://www.cdc.gov/nchs/icd.htm

RxNorm: http://www.nlm.nih.gov/research/umls/rxnorm/overview.html

HCPCS: https://www.cms.gov/MedHCPCSGenInfo/20_HCPCS_Coding_Questions.asp

CPT: http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt.page

UMDNS: https://www.ecri.org/Products/Pages/UMDNS.aspx?sub=Management%20Tools,%20Guidelines,%20Standards,%20and%20Nomenclature

GMDN : http://www.gmdnagency.com/

ICF: http://www.icf-cydevelopmentalcodesets.com/

PHIN-VADS: https://phinvads.cdc.gov/

ISO 639-2: http://www.loc.gov/standards/iso639-2/langhome.html

HL7: http://www.hl7.org/special/committees/vocab/table_0396/index.cfm

CVX: http://www2a.cdc.gov/nip/IIS/IISStandards/vaccines.asp?rpt=cvx

UCUM: http://unitsofmeasure.org/

ASC X12: http://www.x12.org/

III. CREATE GROUPED VALUE SETS

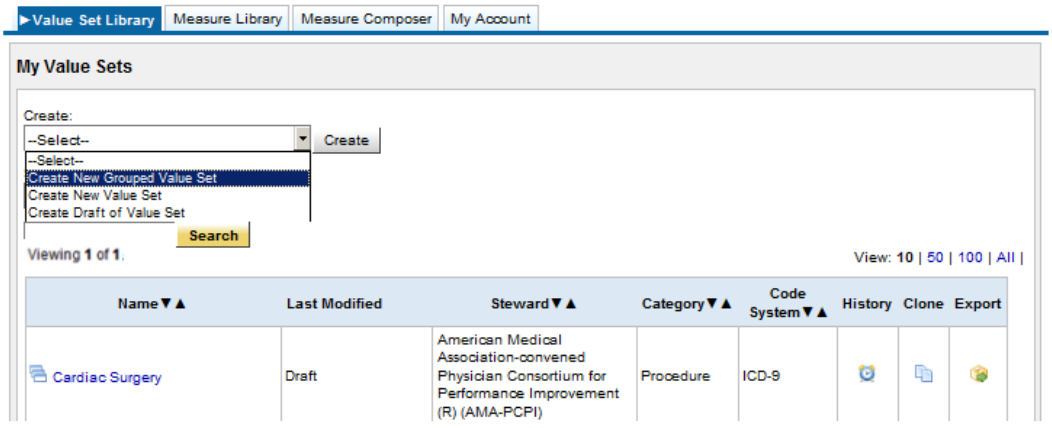
Grouping value set is a way to combine value sets that share similar clinical concepts. These value sets included in a grouping must have the same QDM Category, but they do not need to share the same code set.

Example. For measure NQF 0300's cardiac surgery procedure performed grouped value set, OFMQ uses two value sets: an ICD-9 value set and an ICD -10 value set, both which relate to the cardiac surgery procedure.

Following the creation of the individual value sets, a grouped value set would be created to combine these value sets.

To create a grouped value set:

1. Select the **Create Grouped Value Set** option in the **Create** drop down menu.



2. Enter the **Grouped Value Set Name** in the designated field.

Example. For measure NQF 0300's cardiac surgery procedure performed grouped value set, a possible name is ICD 9 and ICD 10 Cardiac Surgery Grouping. This description will inform the user later on which code systems are in this value set.

- ***Note:*** *For reference in the Clause Workspace, it is helpful to include the word "Grouping" in the name of the grouped value set.*

3. Select a **Steward** from the list of available options or select **Other** to enter a value set steward. If the user selects **Other**, a value must be entered in the User-Defined Steward field.

*Example. For measure NQF 0300's cardiac surgery procedure performed grouped value set, the **Steward** is the American Medical Association.*

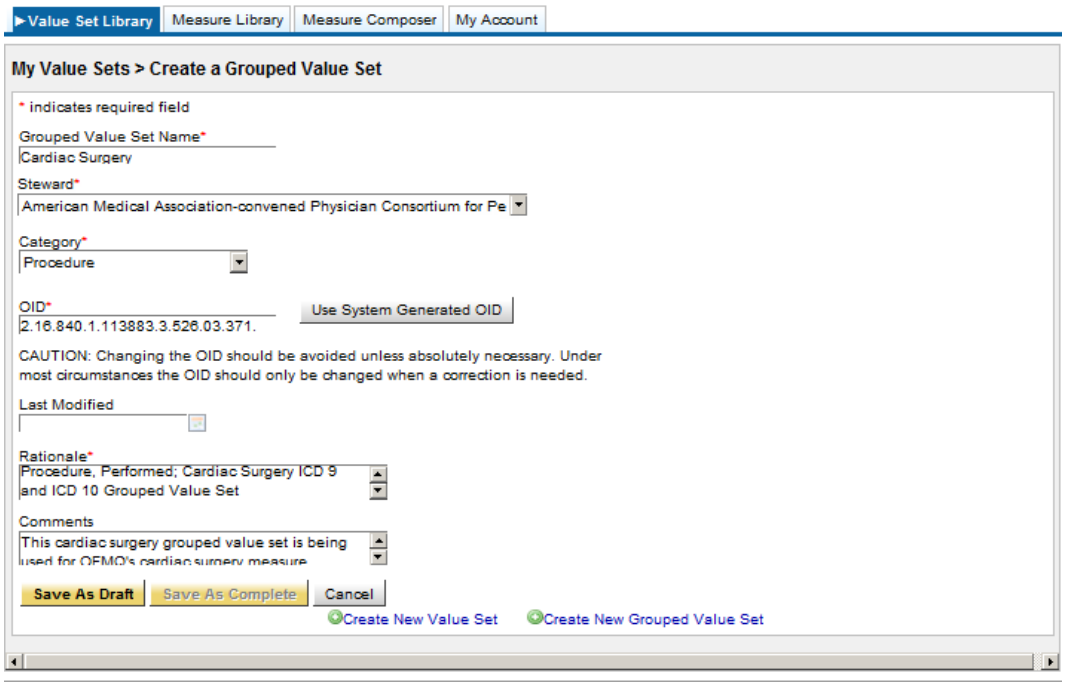
4. Select a **Category**. The MAT will filter the value sets available under Manage Codes based on the category selected. Only value sets with the same category can be grouped together.

5. Enter the value set **OID** if an OID has already been assigned to the value set, or click the **Use System-Generated OID** button to have the MAT automatically create the grouped value set **OID**.

*Example. For measure NQF 0300's cardiac surgery procedure performed grouped value set, the **Category** is procedure.*

- ***Note:*** *Once a user has selected the category and the grouped value set has been saved, the user cannot modify this field. Please confirm the category selection before selecting Save.*

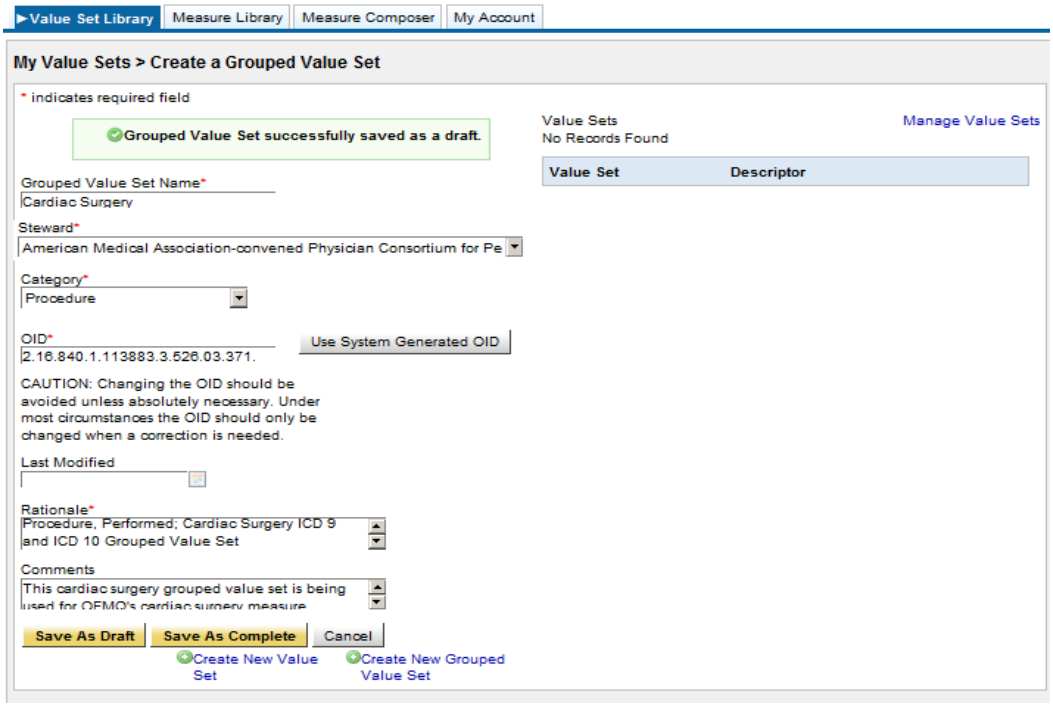
- ***Note:*** *Grouped value sets are referenced in eMeasures through the use of OIDs. The MAT provides uses with the option to auto-generate or manually enter an OID for a grouped Value Set. In general, most users only need to auto-generate an OID for a Grouped Value Set. In the event a user wants to use a grouped value set that exists outside the MAT and has its own OID, a user may choose to enter that set in the MAT and manually enter the OID that belongs to it.*



6. Enter the rationale for the value set in the **Rationale** field.

7. Users can enter comments in the **Comments** box, but this is an optional field.

8. Click **Save As Draft** or **Save As Complete**.

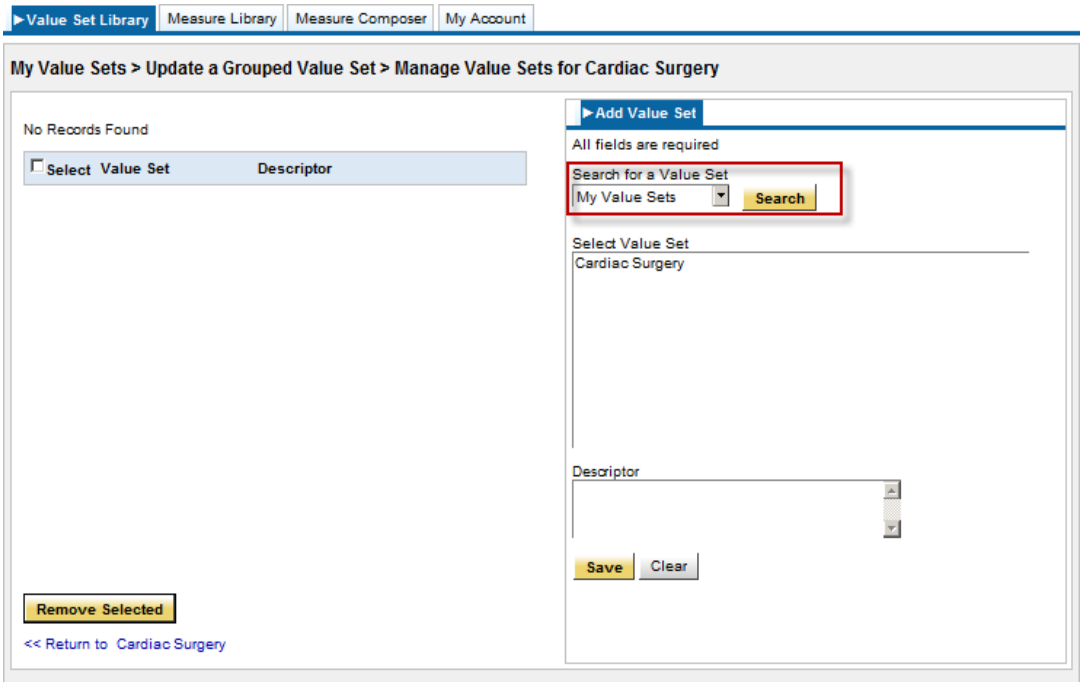


a. The **Save As Draft** function allows a user to update the value set in draft form at a later date.

b. The **Save As Complete** function saves the value set as a final version and adds a finalized date to the value set workspace. Value sets that have been saved as complete cannot be updated. It is not possible to save a draft version of a value set that has been saved as complete.

A "Save Successful" message displays if the user has saved successfully. Users then see a **Manage Value Sets** link on the right-hand side of the screen.

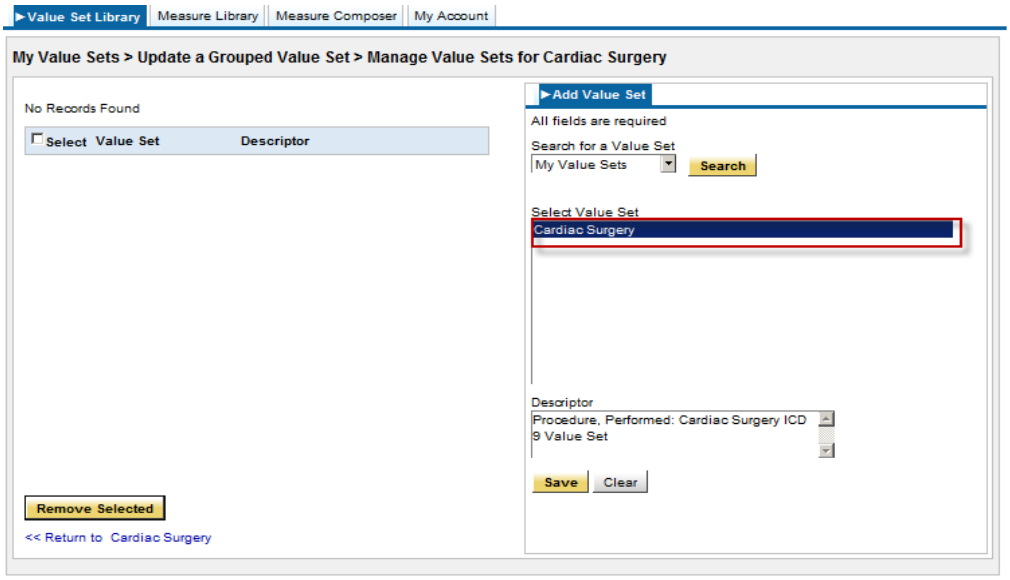
9. Select the **Manage Value Sets** link to add value sets to the grouped value set.



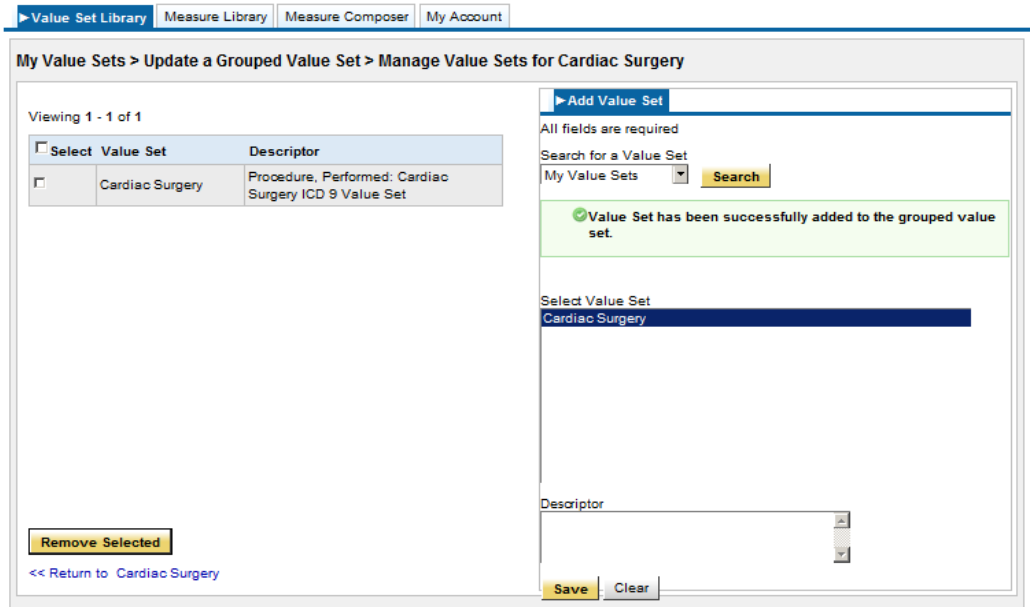
10. Select a preferred filter in the **Search for a Value Set** drop down menu and select **Search**. The filter will default to **My Value Sets**.

11. Highlight the value set to add from the **Select Value Set** box, enter a descriptor for it, and select **Save**.

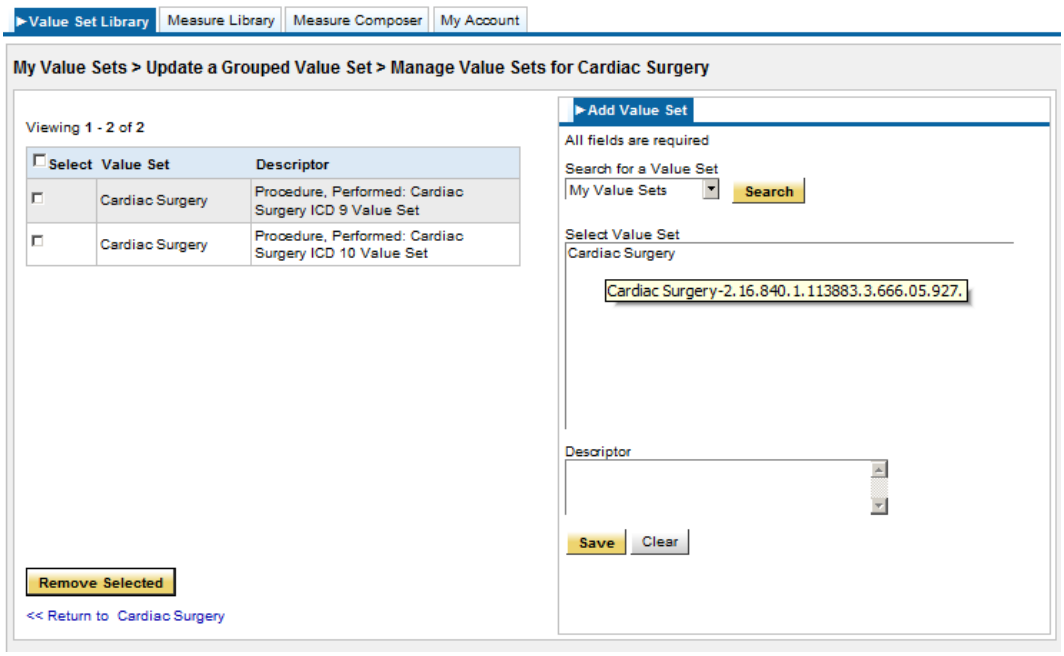
Example. For measure NQF 0300's cardiac surgery procedure performed grouped value set, a possible descriptor for the ICD 9 value set in the Cardiac Surgery grouping is Procedure, Performed: Cardiac Surgery ICD9 Value Set.



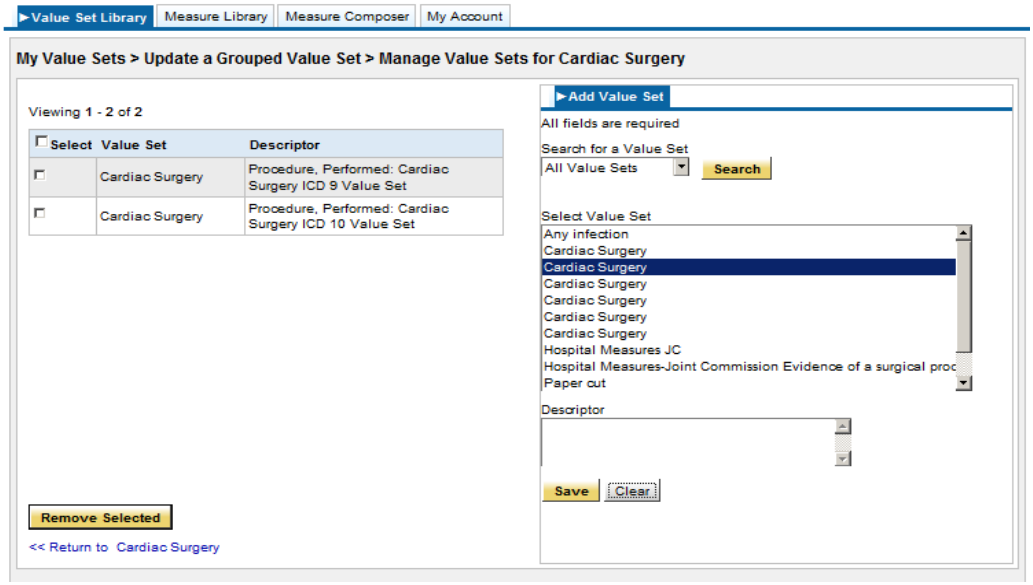
12. A "Save Successful" message will appear if the user has saved successfully.



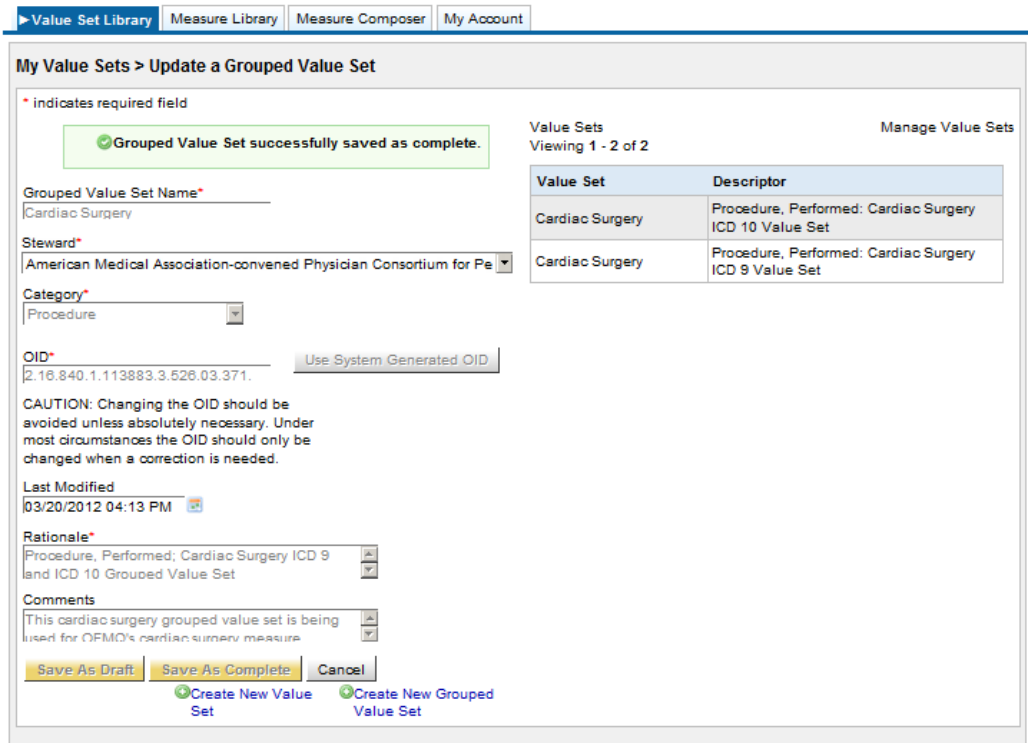
- ***Note:*** *All value sets in the MAT with the same category as the grouped value set displays in the drop-down menu of available value sets. To distinguish value sets that might have the same name, hover over the name of the value set to display the OID for that value set.*



13. Value sets that have saved to the grouped value set appear on the left side of the screen.



14. Once the user has added all value sets, select the **Return to Grouped Value Set Name** link to return to the grouped value set. Here, select **Save As Draft** or **Save As Complete** to save changes. Then, the user will be routed to the Grouped Value Set page.



IV. UPDATE VALUE SETS

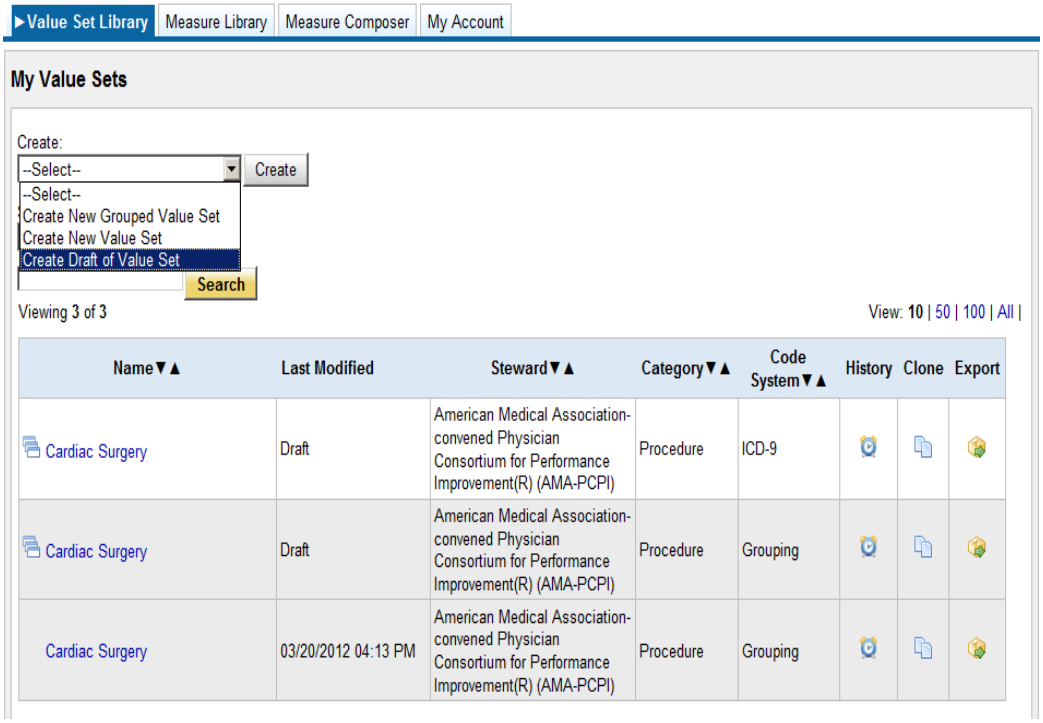
A user is limited to creating and maintaining a single draft of a value set at any time. Only draft value sets can be updated. The **Last Modified** column in the "Value Set Library" displays the date and time of the last saved version of the value set. A visual icon will display to the left of the value set name associated to the most recent version of the value set listing. A variance in shading is used to delineate the value set listings. Any updates made to a value set will automatically update the QDM elements that have been previously created with the list. For example, if the name of the value set is updated, the updated name will be visible within the "Clause Workspace" sub-tab. If you have previously packaged your measure you will need to re-package the measure to capture changes.

- ***Note:*** *Changing the OID should be avoided unless absolutely necessary, any changes will affect all users of the value set. Under most circumstances the OID should only be changed when a correction is needed. For example, a correction may be necessary if/when an incorrect OID was entered in error.*

V. CREATE A DRAFT OF A VALUE SET

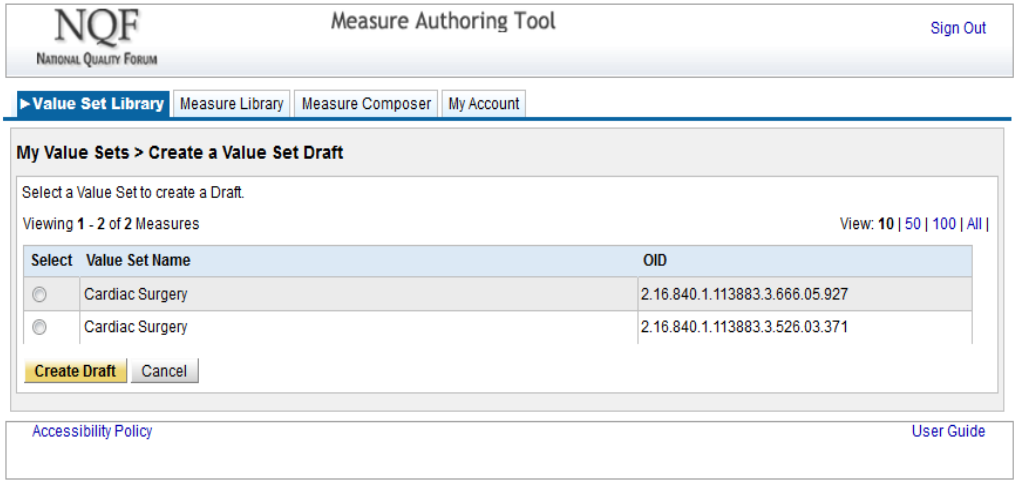
The following steps must be completed to create a draft of a value set:

1. Select the **Create Draft of Value Set** link option in the Create drop down menu.

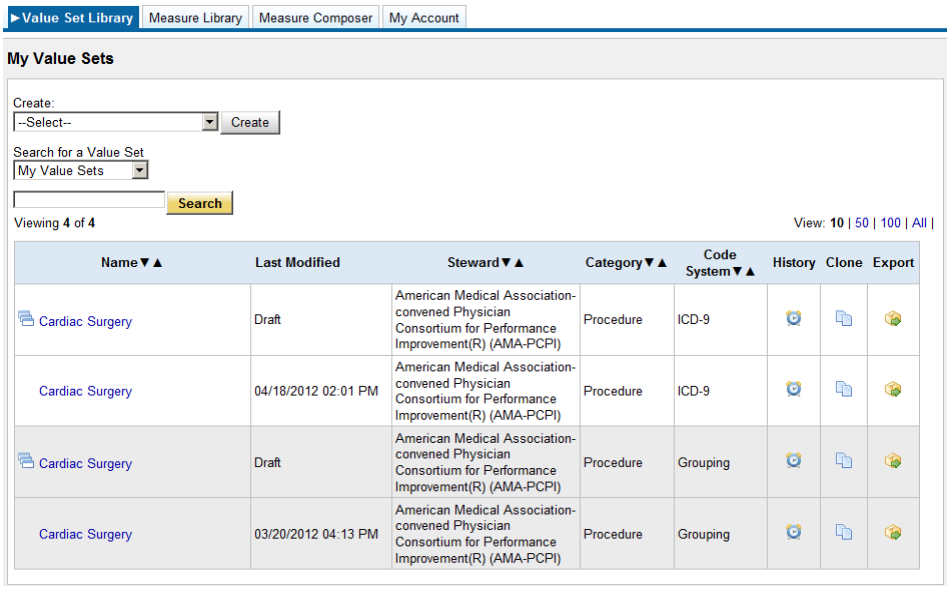


2. Click **Create**.

3. Select the value set that the draft should be created from. Only value sets that are not in draft mode can be selected.



4. Click **Create Draft**. Upon returning to the "Value Set Library," the draft version of the value set appears in that value set family.



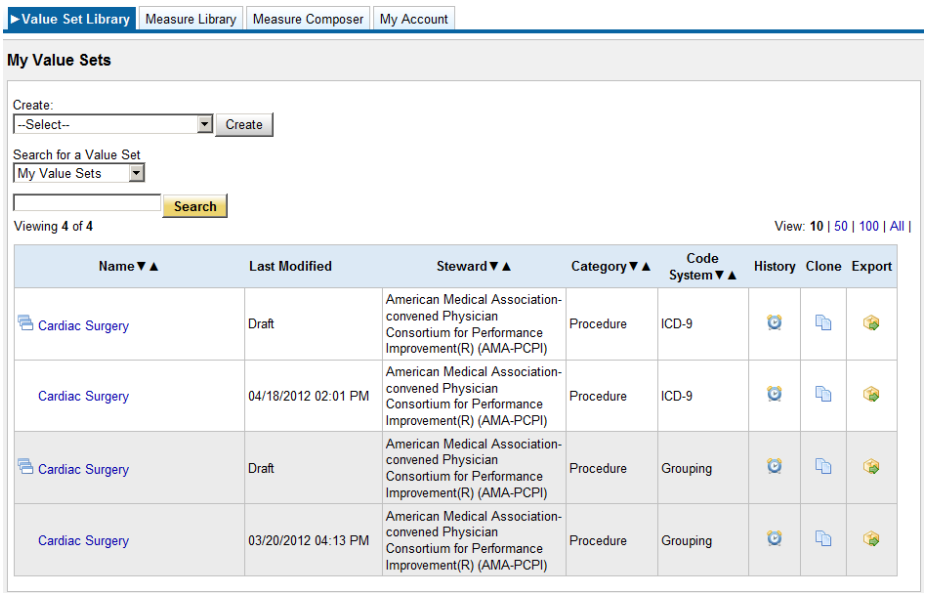
Navigation Tip: For step-by-step instructions on how to apply the Attribute Value Set to the measure, go to page 90. After applying this step, users must add the attribute to the QDM element, instructions can be found in the Build Measure Phrases section of Chapter 9: Measure Composer – Clause Workspace.

VI. EDIT VALUE SETS

A user is allowed to maintain a single draft version of a value set at any time. Only the most recent version can be used for updating. The **Last Modified** column in the value set workspace will display the date and time the value set was saved as complete.

To edit a value set:

1. A visual icon displays to the left of the value set name associated to the most recent draft of a value set listing. A variance in shading is used to delineate the value set listings. Click on the name of the value set to edit.

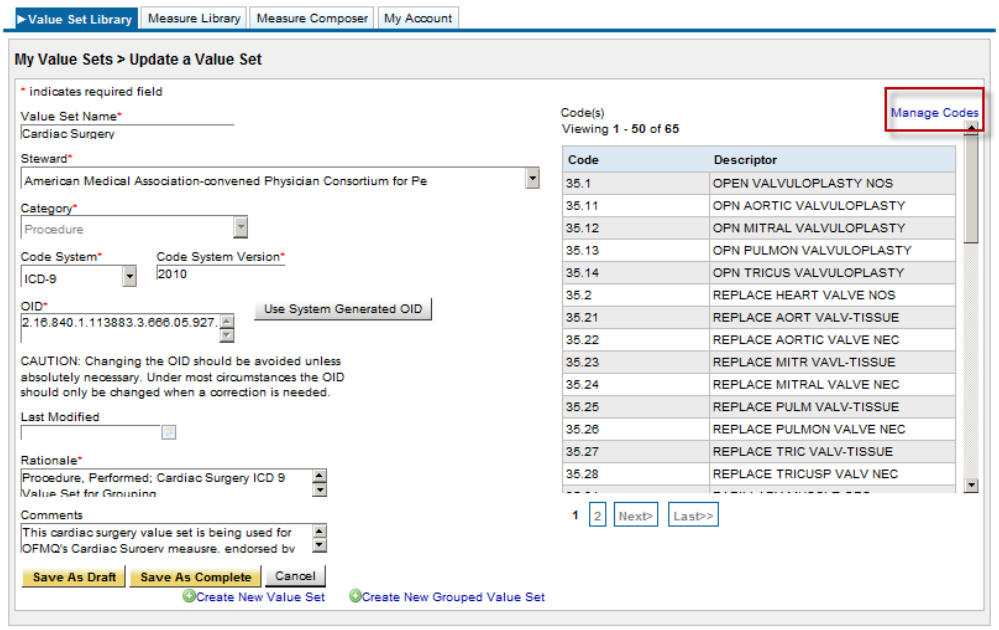


2. When in draft mode, users can edit any of the fields on this page, except for Category and Last Modified fields. A user may update the Value Set name of the current draft being updated, but the value set name of previous iterations will not be updated to maintain historical references. A user may update the OID for the value set. The updated OID is reflected in previous iterations of the value set.

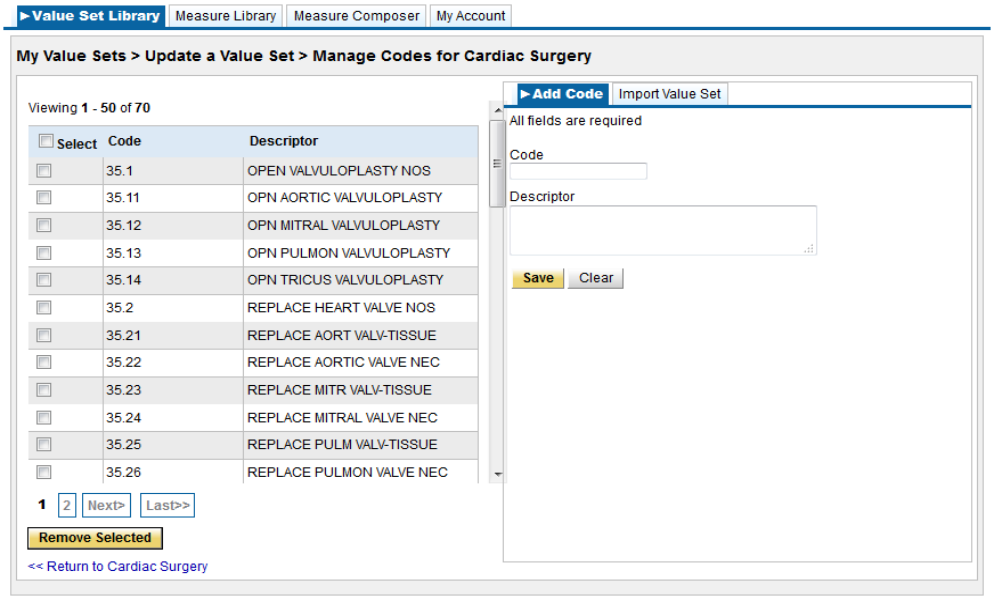
> ***Note:*** *Changing the OID should be avoided unless absolutely necessary, any changes will affect all users of the value set. Under most circumstances the OID should only be changed when a correction is needed. For example, a correction may be necessary if/when an incorrect OID was entered in error.*

3. A "Save Successful" message appears if the user has saved successfully.

4. To edit the codes and code descriptors, select the **Manage Codes** link if in a single value set, or **Manage Value Sets** link if in a grouped value set.



5. Users can add or remove codes from the **Manage Codes** screen.



VII. HISTORY

The MAT records historical events for a value set and provides a value set history log for each measure. The following actions automatically update the value set history log: creation of a draft, saving a version of a value set or a grouped value set, changing of a value set name, updating the last modified date and time, modifying an OID, and transferring ownership. Each event that is automatically logged includes the event title, user name, and the date and time. A transfer of ownership event automatically logs the

event title, user name of the previous owner and the new owner, and the date and time in the Value Set History log.

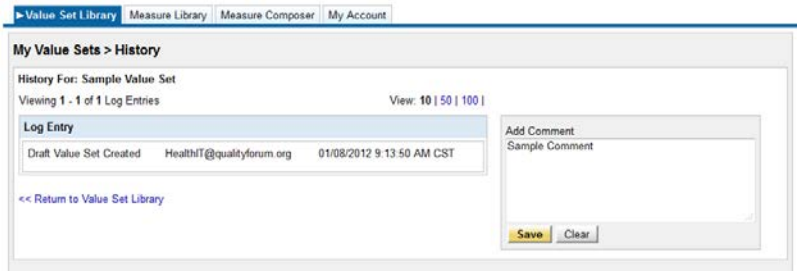
Users can access the value set history log by following the steps below:

1) Select the “Value Set Library” tab.

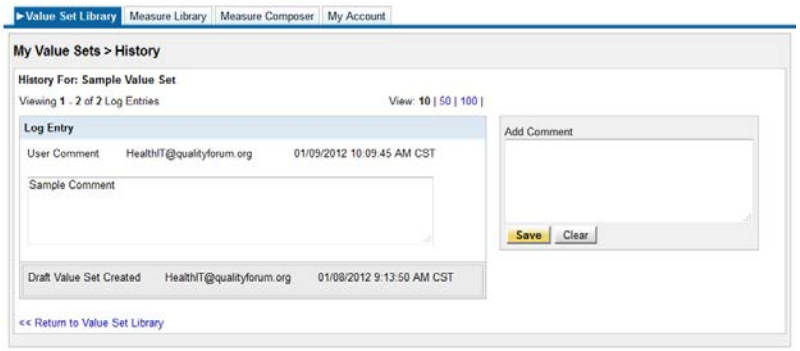
2) Select the clock image under the **History** column.

A. User Is Value Set Creator

Users who access value sets they have created can view and add user-defined events to the history. This function allows the user to manually enter additional value set activities that are not captured in the auto-logging process. User-defined events to the history log can only be added to draft value sets.



To add a comment to the value set’s history, a user can enter the verbiage in the **Add Comment** field and click **Save**. This field will support up to 2,000 characters.



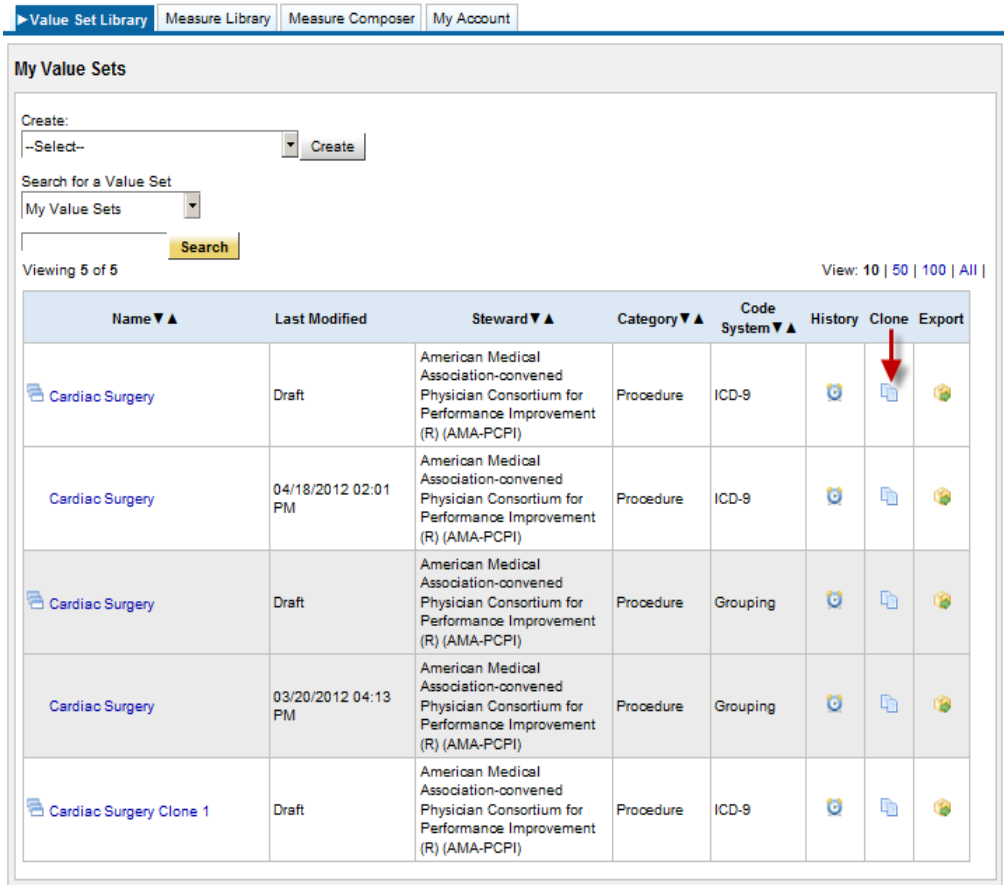
B. User Is Not Value Set Creator

Users accessing value sets they do not own can only view events in the history log. These users can not add user defined events to the history log.

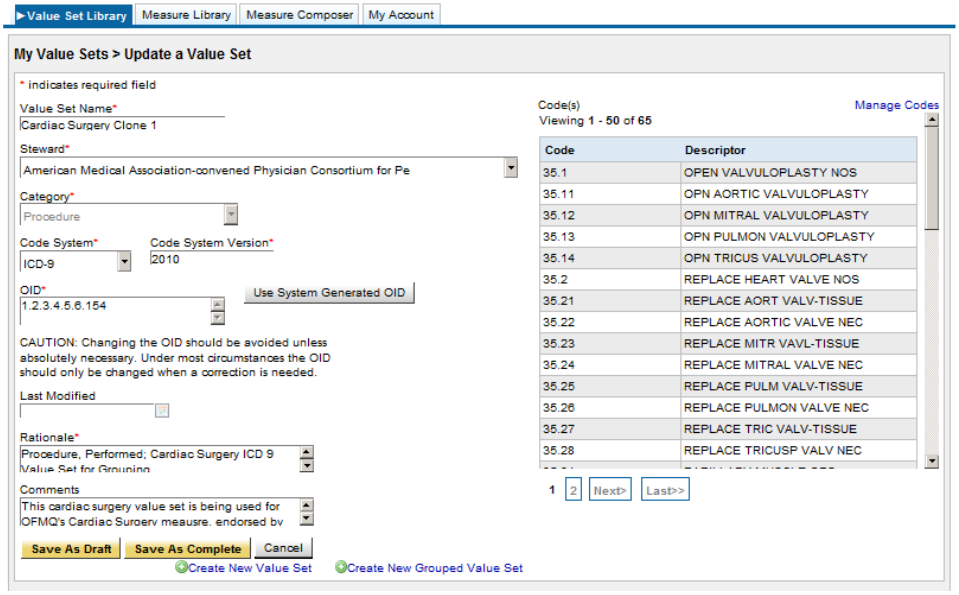
VIII. CLONE

Users can Clone any existing Value Set or Grouped Value Set to create a new Value Set or Grouped Value Set in Draft mode. Users can clone Value Sets they own or Value Sets owned by another user.

1) Click on the Clone icon in the Value Set Library.



Users are directed to the Update Value Set page.



Several of the fields will be automatically copied forward to the new Value Set. These fields include:

- Steward
- Category
- Code System
- Code System Version
- Rationale
- Comments
- Code(s)
- Descriptor(s)

As the name of the Value Set or Grouped Value Set must be unique, the tool will automatically generate a name by combining the previous Value Set Name followed by the word 'Clone' and a number.

2) Users should rename the Value Set to provide a meaningful name.

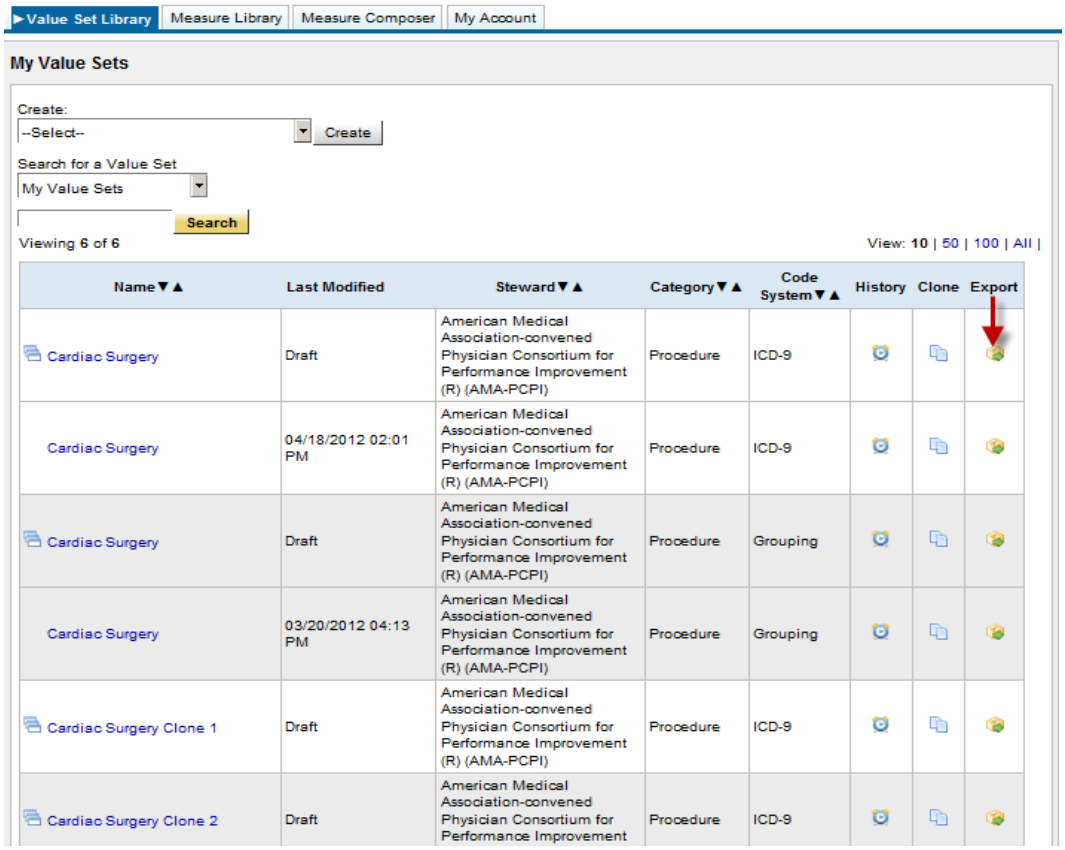
The tool will also automatically create a system generated OID when a Value Set or Grouped Value Set is cloned. Users may change the OID as long as it is a unique OID within the Measure Authoring Tool.

3) Once changes have been made users can click **Save As Draft** or **Save as Complete**

IX. EXPORT

Users can Export any individual existing Value Set or Grouped Value Set regardless if it has a Last Modified Date or is in Draft mode. Users can export Value Sets they own or Value Sets owned by another user.

Click on the Export icon in the Value Set Library.



The Value Set Export contains the same column headers as the Measure Value Set Export. The disclaimer tab will appear as the first tab, followed by the Value Set tab.

Note: *The tab name for the value set will display the first 30 characters of the Value Set/Grouped Value Set name. The following characters not supported by Microsoft Excel for worksheet names will be removed from the name of the worksheet:*

: \ / ? * [ ]

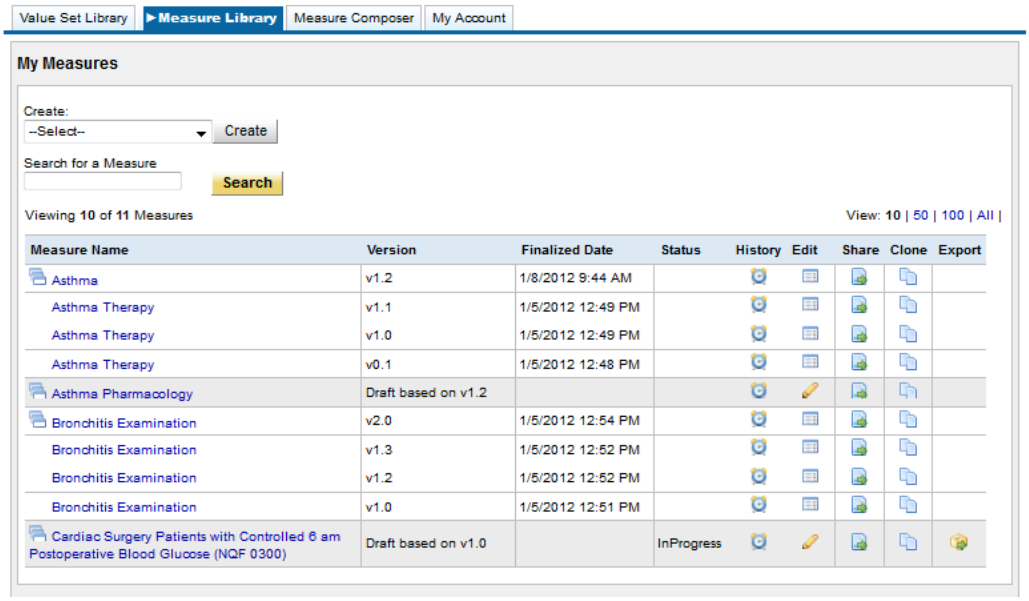
If values have not been added using Manage Values for a Value Set or value sets have not been added using Manage Value Sets for a Grouped Value Set, only the column headers and any existing metadata will appear.

Chapter 7

Chapter 7: Measure Library

> **Chapter Overview:**
>
> *This chapter highlights the features of the "Measure Library." Users will learn how to create new measures, save a measure as a major or minor version, create a new draft to modify an existing measure, access existing measures, prepare measures to be exported, and clone measures.*

When users sign in, the first screen presented is the "Value Set Library" tab (one of the four tabs across the top of the screen). This section of the User Guide describes the "Measure Library" tab. The "Measure Library" displays all measures the user has created or has been granted access rights.



The Measure Authoring Tool (MAT) retains all saved versions and one draft version (based on the latest 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.

Icon depicting the most recent version of a measure family in the MAT

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.

When a measure is in draft mode, the user is given the opportunity to save without versioning, save as a major version, or save as 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 save a draft as a major version, the MAT will increment the version number to the next major whole number that is available (e.g. 1.5 would increment to 2.0). When a user saves a draft as a minor version, the MAT will increment the version number to the next decimal increment that is available (e.g. 2.4 would increment to 2.5). Version numbers are not re-used within an individual measure.

The measure name, version number, and finalized date (for versioned measures) will display on all of the "Measure Composer" sub-tabs (measure details, clause workspace, and measure packager) to allow users the ability to verify that the correct Measure and Version is being created or edited.

Users can create a new measure or a draft of an existing measure, and 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.

- ***Note:*** *A user accessing the MAT for the first time after the Enhanced release will view all measures within their "Measure Library" draft form as Version '0'.*

I. 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 will be 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 will streamline use of the MAT. Once users have defined 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, and continuous variable measures (each is a unique method of measure scoring). Appendix D lists 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.

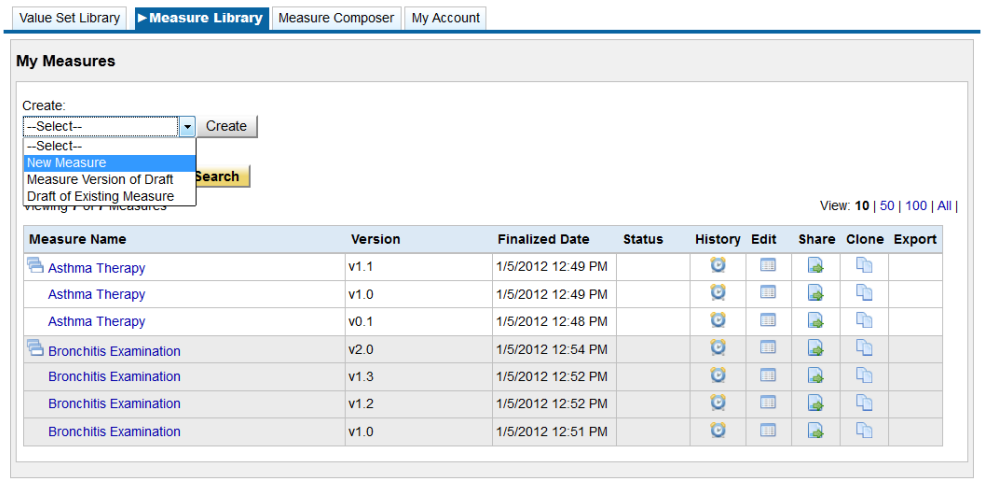
Example. This example describes the intent and purpose of NQF 0300. The intent of this measure is to measure patients that have a glucose level of less than or equal to 200 mg/dL, one and two days after cardiac surgery requiring general or neuraxial anesthesia.

With this basic information, users can add information in the MAT to create the measure.

Navigation Tip: To begin creating a measure, users should follow the instructions listed below.

To create a measure in the MAT:

1. Select the **New Measure** option in the **Create** drop down menu and click **Create**.



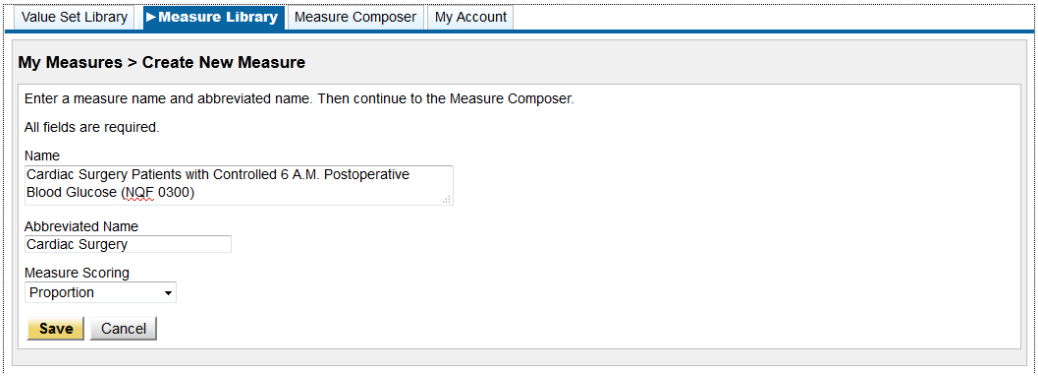
2. Enter the **Name** of the new measure as well as an **Abbreviated Name**. The **Abbreviated Name** is used in the naming convention of the system clauses in the "Clause Workspace." The **Name** and **Abbreviated Name** should not include special characters, such as ? . , ; : [ ] ( ) / < > - _' " * & % # @ ! The **Name** and **Abbreviated Name** can be edited in the future. For instructions, click here. Try to choose a short, but sufficiently descriptive **Abbreviated Name** as it is used in the MAT to name the file when the measure is exported.

*Example. The **Name** for the measure NQF 0300 provided by the measure steward, OFMQ is Cardiac Surgery Patients with Controlled 6 A.M. Postoperative Blood Glucose (NQF 0300). An example of an **Abbreviated Name** a user may provide is Cardiac Surgery.*

3. Users must also select the type of **Measure Scoring**. This field displays the type of **Measure Scoring** for a given measure: **Continuous Variable, Proportion**, and **Ratio**. The **Measure Scoring** (type) can be edited in the future. For instructions, click here. As noted in Appendix D, 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.

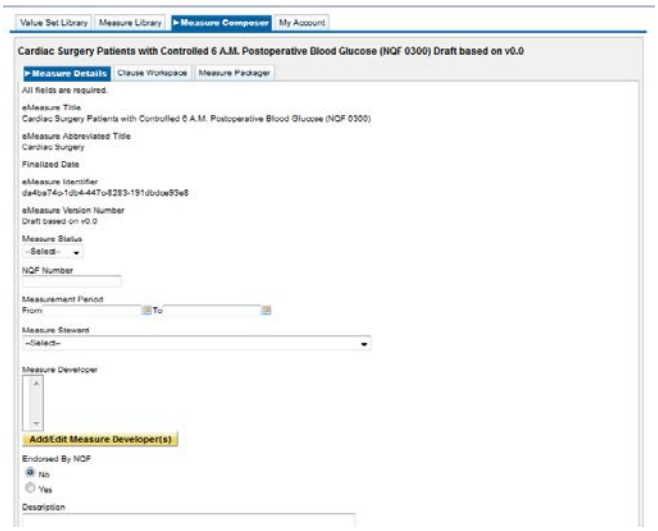
*Example - The **Measure Scoring** for the measure NQF 0300 is proportion. The measure is a proportion measure because the numerator population is also in the denominator.*

For definitions on the various types of **Measure Scoring** (proportion, ratio, and continuous variable), please visit the glossary.



4. Select **Save**. 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.

5. Once **Save** is selected, the MAT navigates the user to the “Measure Details” sub-tab in the “Measure Composer.”



Measure Details Tab
Here, the user has the option to enter information in the "Measure Details" sub-tab any time before packaging the measure to export.

Clause Workspace Tab
Users can navigate to the "Clause Workspace" sub-tab to build the logic of the measure. All required system clauses for that measure scoring type must be completed prior to packaging the measure for export.

Measure Packager Tab
The "Measure Packager" sub-tab allows users to package only the system clauses the user is interested in exporting. Users can package various combinations of their measure.

Each of these sub-tabs' functions and features are reviewed in detail in the subsequent chapters.

When a new measure is created, the Measure History log automatically captures the time and date the new measure was created along with its name. Users may review all historical events associated with a measure by accessing the Measure History log.

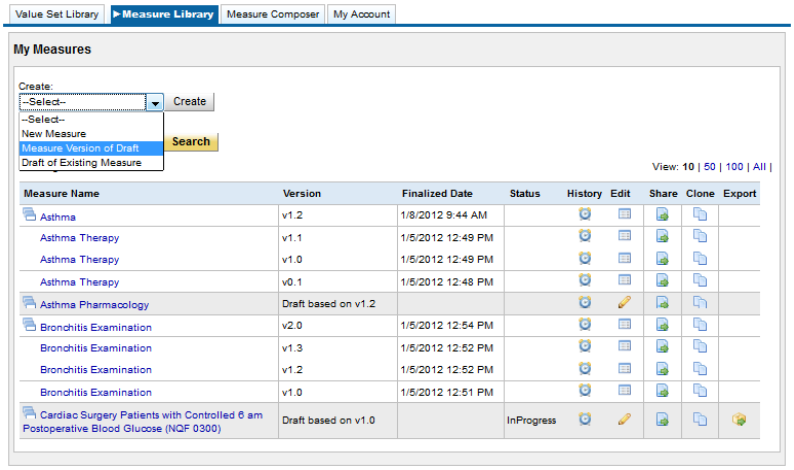
Navigation Tip: Once a user has entered the above details for a new measure, the next step is to build the measure in the "Measure Composer" tab.

II. 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.

Navigation Tip: To create a measure version of a draft, follow the instructions listed below.

1. Select the **Measure Version of Draft** option in the **Create** drop down menu and click **Create**.

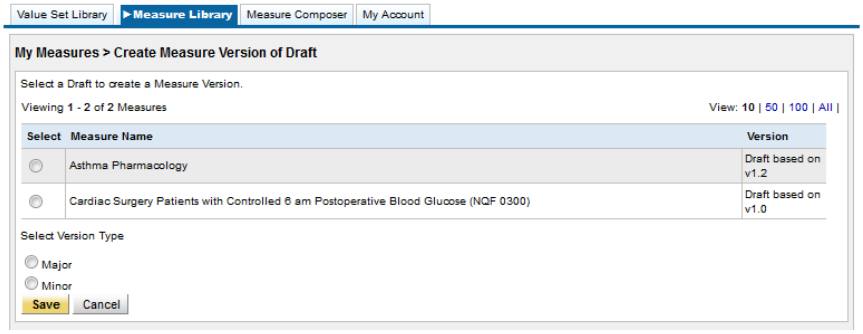


2. Select the measure draft needed to create the desired measure version.

3. Select the version type, either **Major** or **Minor**.

   a. When a user selects to **Save a Draft as a Major Version**, the MAT increments the version number to the next major version number that is available (e.g. 1.5 would increment to 2.0).

   b. When a user selects **Save a Draft as a Minor Version**, the MAT increments the version number to the next minor version number that is available (e.g. 2.4 would increment to 2.5). Version numbers are not re-used.



4. Click **Save**. The MAT will automatically log 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.

5. Once **Save** is selected, the MAT navigates to the "Measure Library" tab. The new Measure Version displays in the "Measure Library" next to the Measure Name.

Navigation Tip: To continue working on the measure, select the draft version of the measure, in which users will be directed to the "Measure Composer" tab to build the logic of the measure.

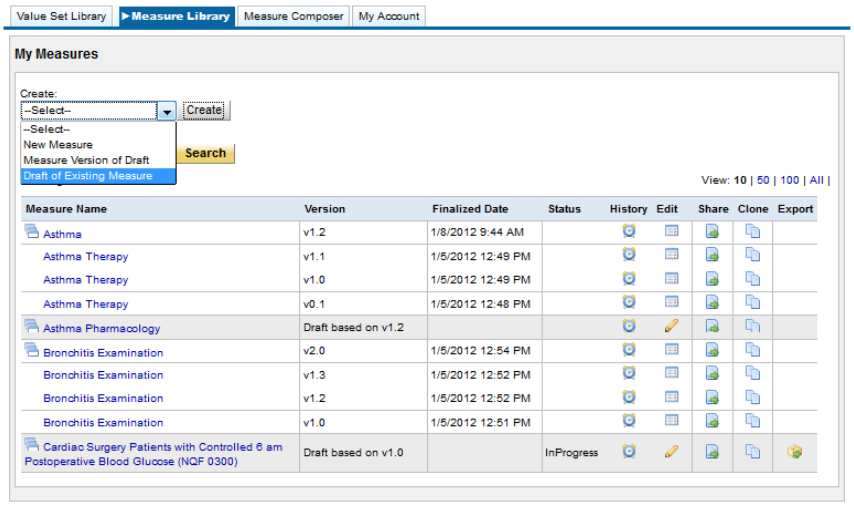
III. CREATE A DRAFT OF AN EXISTING MEASURE

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 version of the measure already exists, the user can edit the draft version but cannot create a new draft. Users should confirm that no draft version of the measure exists and then determine what measure version to use to create the desired draft version of the measure.

For instructions on how to save a draft version as a major or minor version, click here.

Navigation Tip: To edit an existing versioned measure, users should follow the instructions listed below.

1. Select the **Draft of Existing Measure** option in the **Create** drop down menu and click **Create**.



2. Select the appropriate Measure Version to create the desired draft.

3. Click **Save and Continue** located on the bottom left side of the screen.

4. Once **Save and Continue** is selected, the MAT automatically navigates to the "Measure Composer" tab.

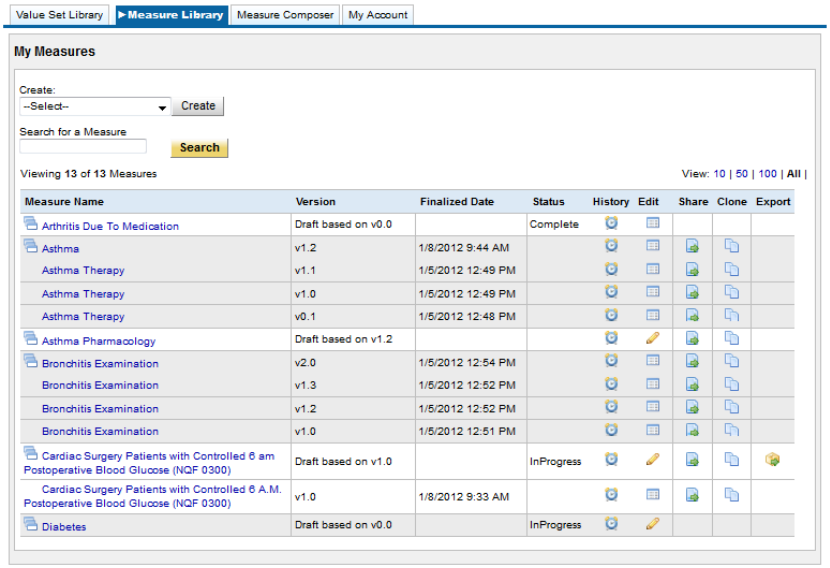
Navigation Tip: To continue working on the measure, select the draft version of the measure to then navigate to the "Measure Composer" tab where the logic of the measure can be built.

IV. ACCESS EXISTING MEASURES

The "Measure Library" displays a list of measures that either the user has created or that have been shared with the user.

A. User Is Measure Author

If the user accessing the measure is the measure author, 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 author, then the icons do not appear, thus disabling the History, Edit, Share, and Clone functions.

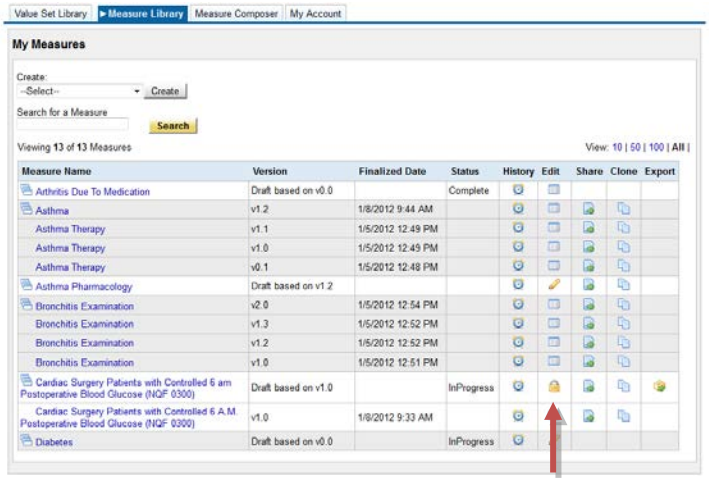


Note that the **Export** option is available only when the measure has sufficient content that includes all components needed to define an eMeasure. Even though the **Export** function is enabled, the measure author can still decide if the **Status** of the measure is **Complete** or **Still In Progress**. For instructions on how to change the Status of a measure, please see the Measure Status section in the Measure Composer-Measure Detail chapter.

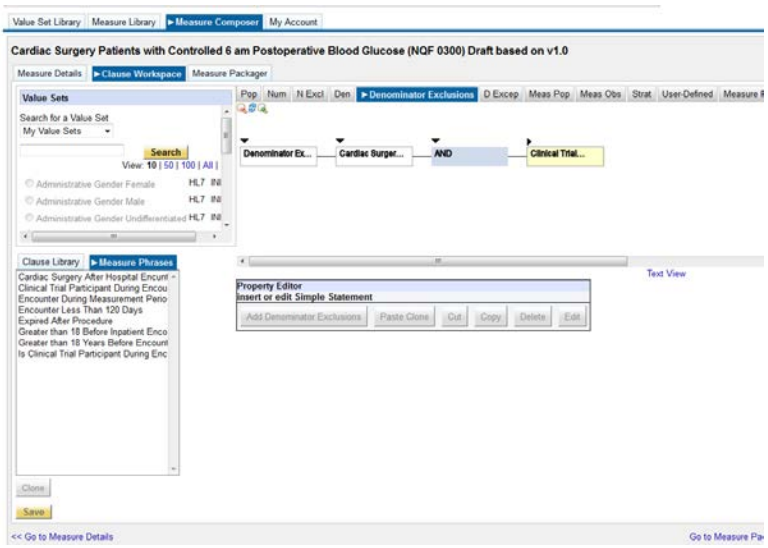
B. User Is Not Measure Author

If a measure has been shared with the signed-in user, one of two options is displayed, depending on the permission granted by the author: **View Only** or **Edit**.

If a measure is being edited by another user, the pencil icon under the **Edit** column will change to a padlock icon to signify to users that the measure is currently locked for editing by another user. Hovering over the icon will display the e-mail address of the user currently accessing the measure. The Measure History Log will capture the edits the user makes to the measure along with the user name.

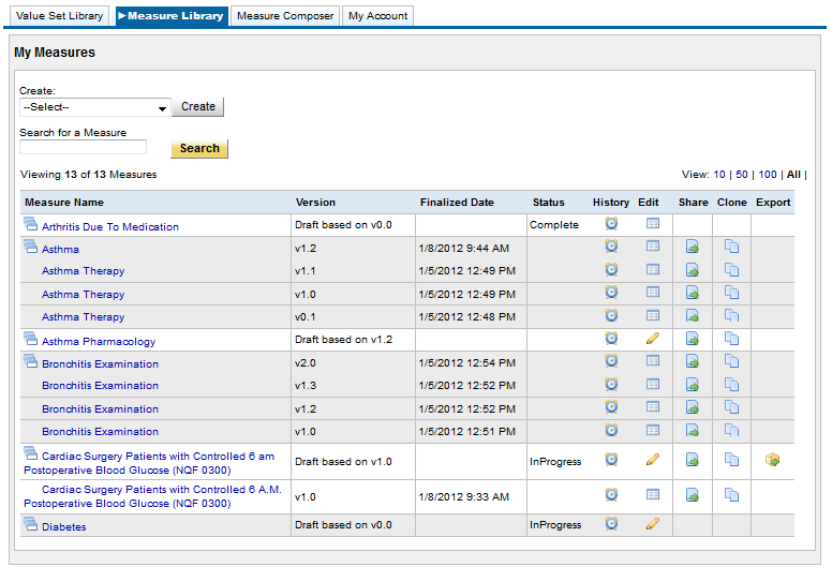


The image below is the "Clause Workspace" for the Cardiac Surgery measure highlighted above. This measure is being edited by another user, therefore it is in view only mode and the property editor, value sets box, and clause library/ measure phrases are disabled.



V. SEARCH EXISTING MEASURES

Users can scroll through the existing measures or search for specific measures in their "Measure Library" by using the **Search** function. This function allows users to search by **Measure Name**, **Abbreviated Measure Name**, **Measure Owner**, or **Measure Steward**.



The search for a component of the measure name results in a display of all measures containing that component. If there are no measures that match the search, no measures will be displayed.

VI. HISTORY

The MAT maintains a log of certain events for a measure and provides users the ability to access the Measure History log. Events that are automatically logged are the creation of a draft measure, the versioning of a measure, the creation of a measure package, the sharing of measures with another user, and the Transfer of Ownership to another user.

Each event that is automatically logged includes the Event Title, User Name, and the Date and Time in the Measure History log. A Transfer of Ownership event will automatically log the event title, user name of the previous owner and the new owner, and the date and time in the Measure History log. Further information and instructions on requesting Transfer of Ownership can be found here.

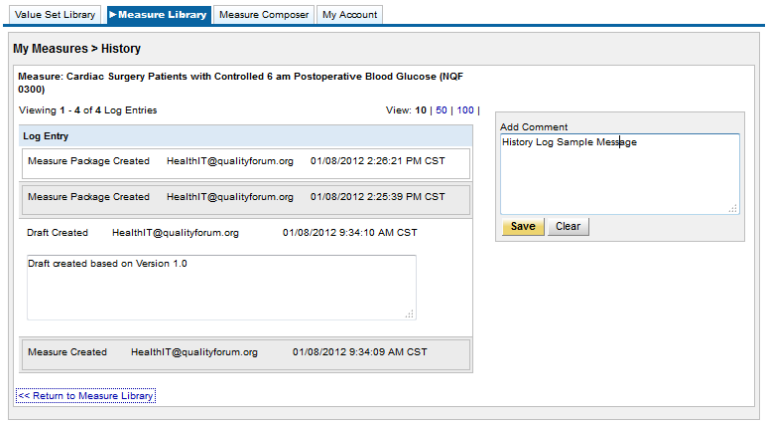
A. Manually Recording an Event in the Measure History Log

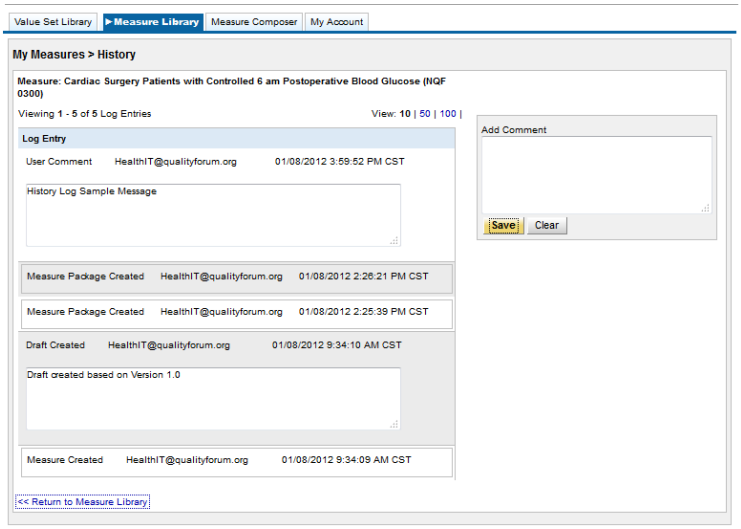
Users also can log other events or measure activities not captured in the auto-logging process manually in the Measure History log. Step-by-step instructions on how to log an event manually are listed below:

1. Select the "Measure Library" tab.

2. Select the clock image in the History column for the measure you would like to view. Users can add a comment to the Measure History Log for the measures they created and that are in draft form.

3. Enter text in the **Add Comment** field and select **Save** to add the event to the Measure History Log.

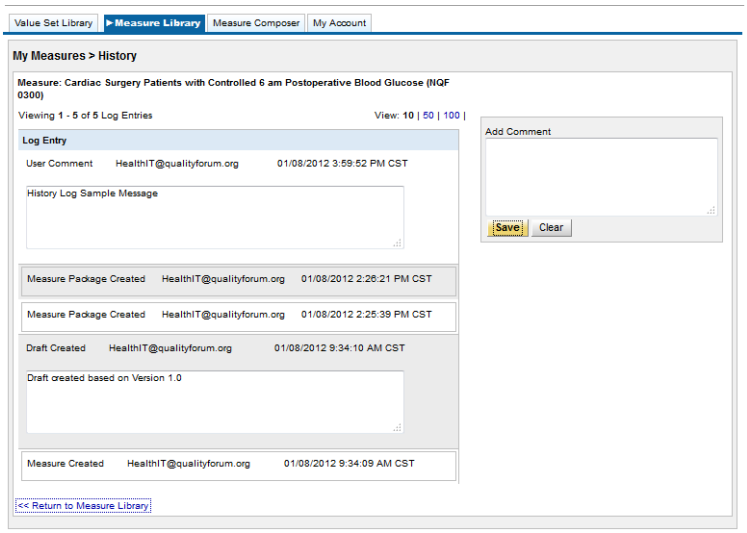




   a. This field supports up to 2,000 characters.

B. User Is Measure Author

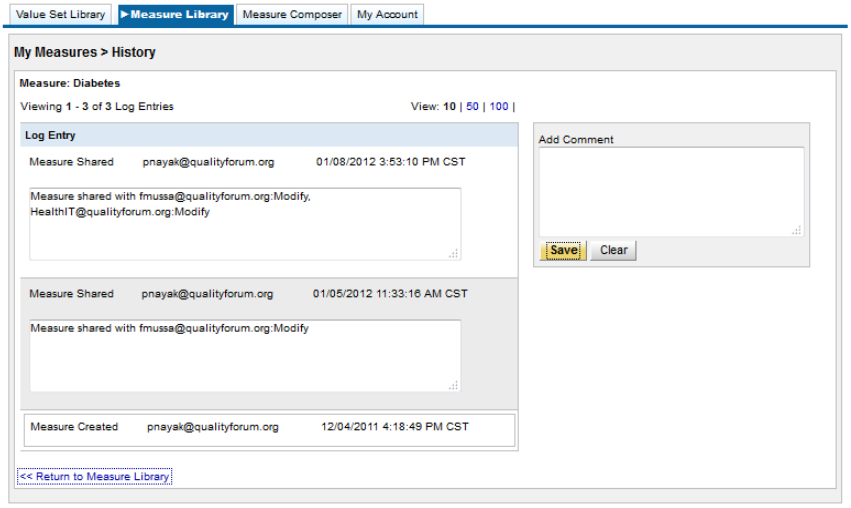
Users who are measure authors can view and add user-defined events to the history of draft versions of measures they have.



C. User Is Not Measure Author

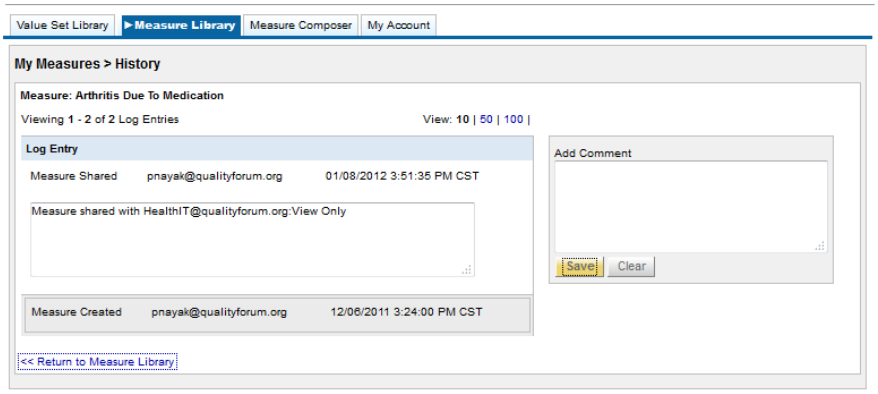
- Modify Access

Users who have been given modify access can view and add user-defined events to the history.



- View Only Access

Users who have been given view only access can view the history but are not allowed to add user-defined events comments to the history.



VII. EDIT

The measure author or those to whom the author has given permission may edit a measure name, the 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 that the measure is currently locked for editing by another user. Hovering over the icon displays the e-mail 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, create a draft of that version. For instructions, click here.

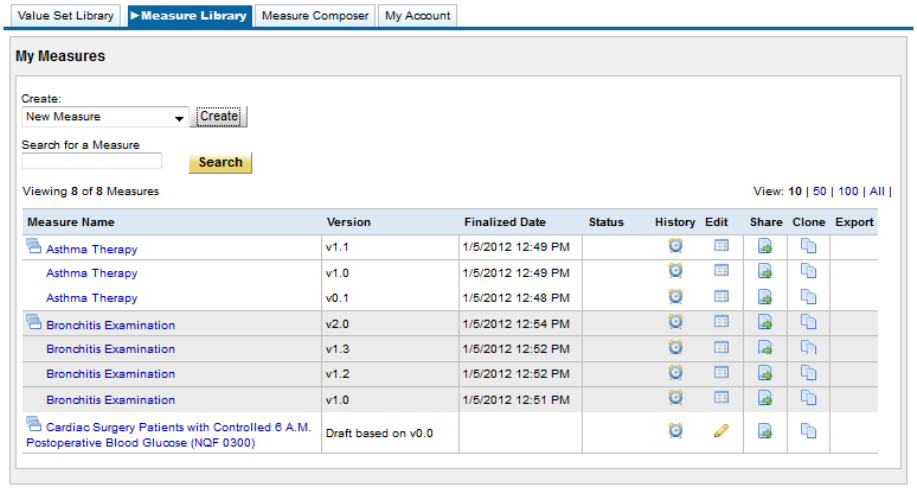
A. Edit the Measure Name or Measure Scoring (Type)

To edit the **Name** or **Abbreviated Name** of an existing measure, follow the steps listed below:

1. Select the "Measure Library" tab.

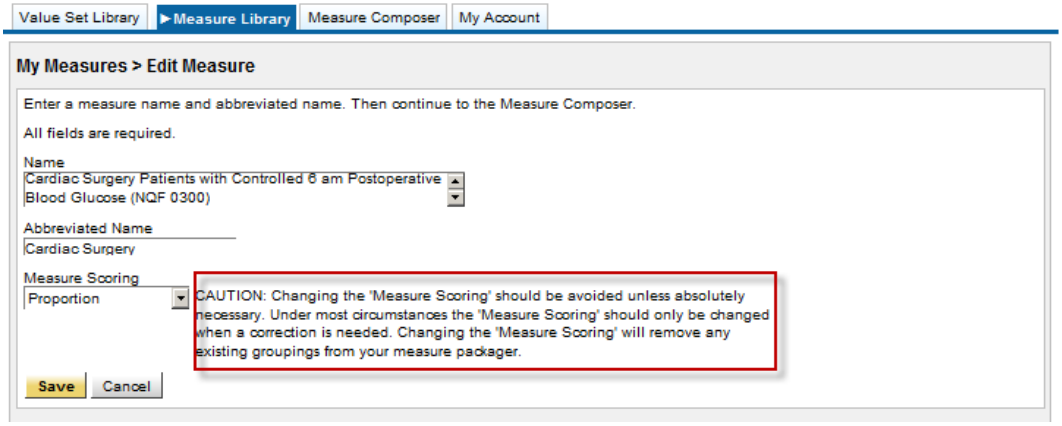
2. Select the pencil icon after the **Measure Name** under the **Edit** column. Click on the pencil icon to edit the Measure Name, Abbreviated Name, or Measure Scoring.

- ***Note:*** Clicking on the **Measure Name** will take the user to the measure details sub-tab in the "Measure Composer" tab.



3. The next screen 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 **Save**.

> - ***Note:*** *When the Measure Scoring selection is changed after a measure's initial creation any existing Measure Grouping(s) will be automatically deleted from the 'Measure Packager' tab.*



4. Users will automatically be directed 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 versions of that measure. Versions of the measure previous to the name change retain the name of the measure at the time that version was saved.*

B. Edit the Measure—Measure Logic

To edit a measure's details, or clauses, complete the following steps:

1. Select the “Measure Library” tab.

2. Select the current, draft version of the measure in the “Measure Library” tab by selecting the measure under the “Measure Name” column.

3. Users are directed to the “Measure Details” sub-tab for the selected measure.

4. Select the “Clause Workspace” sub-tab.

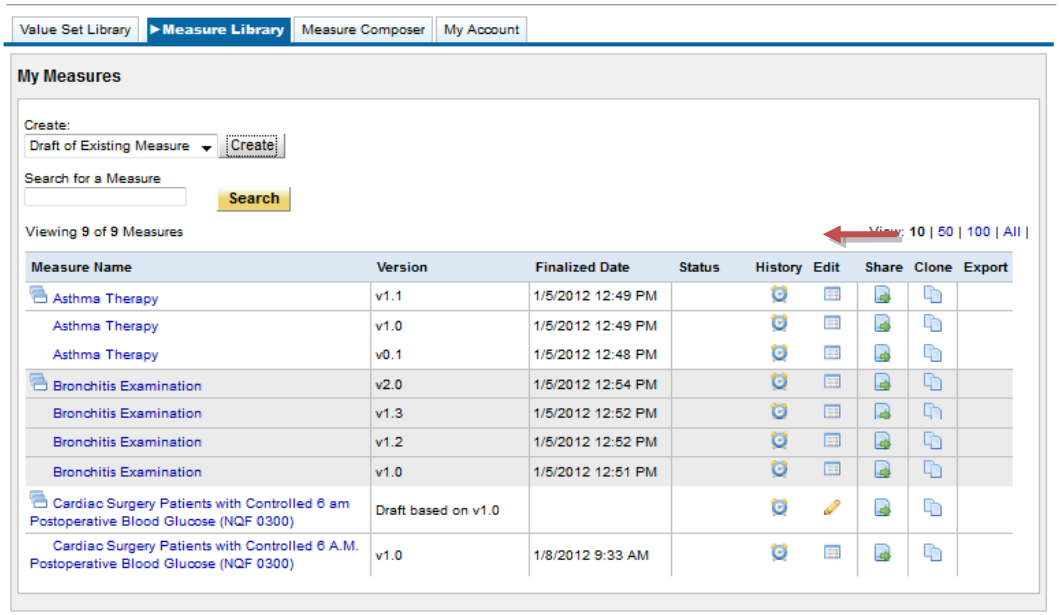
VIII. SHARE

A measure author can share his or her measures with other MAT users by granting them permission through the share icon in the “Measure Library” tab. Reasons to allow sharing include the ability to have other users view and comment on individual measures or to allow other users to edit the measure.

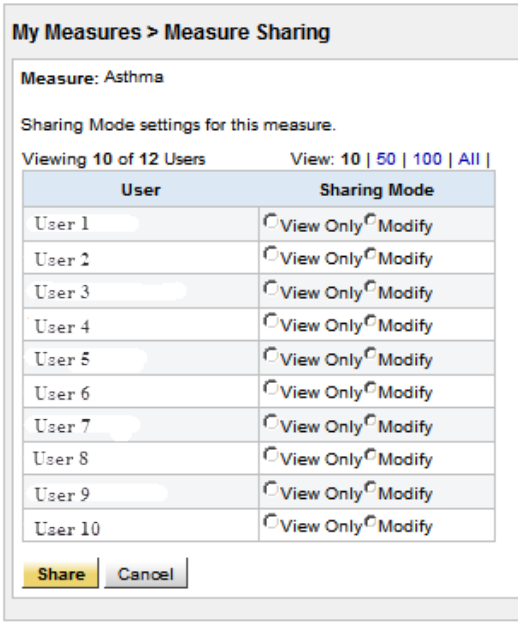
A. Sharing Measures with Other Users

All measures created by the MAT user include an icon in the **Share** column of the “Measure Library”. The measure creator can share a measure with other users following the steps listed below.

1. Select the **Share** icon.



a. Users will be presented with a list of all other MAT users with whom sharing is possible.



2. Share the measure with a user by selecting either the **View Only** or **Modify** radio button depending on the function expected from the other user.

3. The user can select with whom to share the measure and then click the **Share** button at the bottom of the page. If the permission includes editing ability, the recipient user sees a pencil in the **Edit** column. If the permission is View Only, there is no pencil icon in the **Edit** column

4. If a selection is made in error, select **Cancel**.

- ***Note:*** *Once a measure is shared with another user, the permission to share cannot be revoked. However, the measure creator may change the Sharing Mode of the shared measure at any time.*

For measures the user did not create, the **Share** column will not display the share icon. Only the measure creator can assign permission for others to access the measure.

The presence of the share icon indicates the measure is owned by the user. The padlock icon represents a measure that is shared with other users and is currently being edited. Hovering over the padlock icon will display the email address of the user who is editing the measure. The rectangle icon represents a measure that can be read in **View Only** mode. The pencil icon represents a measure shared in Modify mode.

B. Accessing Shared Measures

The pencil icon will appear on a user's "Measure Library" screen for each measure that has been shared in **Modify** mode by its creator.

If the measure has been shared in a **View Only** mode, a pencil icon will not appear in the **Edit** column and the ability to modify the measure will be disabled. The measure can be viewed by clicking on the measure name as noted in the section regarding measure editing. However, a user with **View Only** permission will not be able to edit the measure or the measure name. Users also can also access measures that are locked, but only in **View Only** mode when they are being edited by another user.

C. Transfer of Ownership

Requests to transfer ownership of measures and value sets to another user may be submitted to the Measure Authoring Tool Help Desk. This request will transfer ownership of all objects owned by one user at that time to another user. It is not possible to transfer ownership of individual measure or value sets.

Example. If User A changes roles at an organization and User B will be fulfilling User A's job responsibilities, then a transfer of ownership request can be submitted to transfer ownership of all measures and value sets from user A to User B. User B can submit the request to MATSupport@qualityforum.org with a description of the situation (User A is no longer at the organization. User B is fulfilling User A's roles.) MAT support staff will follow-up with User B informing them when the transfer of ownership of all of User A's measures and value sets will occur. Following the transfer, User A will no longer have access to the measures and value sets unless User B shares them with User A.

When a **Transfer of Ownership** request is completed, a transfer of ownership history entry will be logged in the history for all measures and value sets whose ownership was transferred from one user to another.

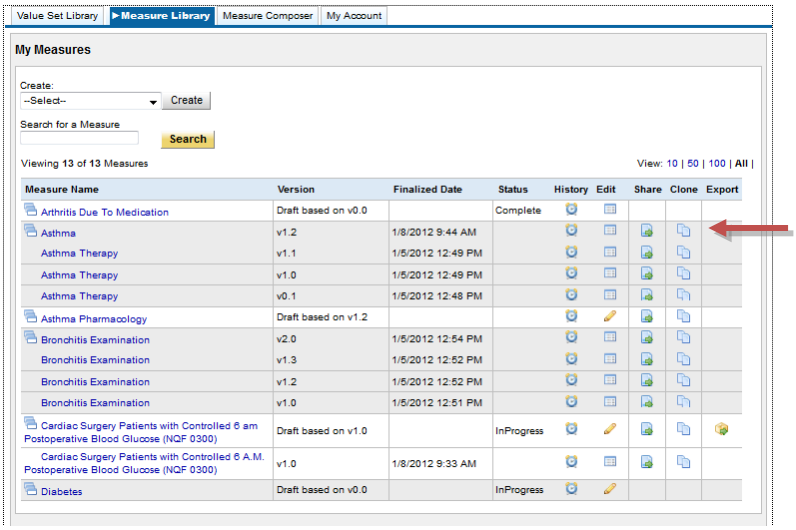
IX.CLONE

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 as composites without the need to -rebuild phrases and logic. It also allows users to make updates that can be saved as new versions of the same measure.

The **Clone** icon appears for measures that created by the signed-in user. By selecting the **Clone** icon, users clone all pieces of the existing measure into a new measure. 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.

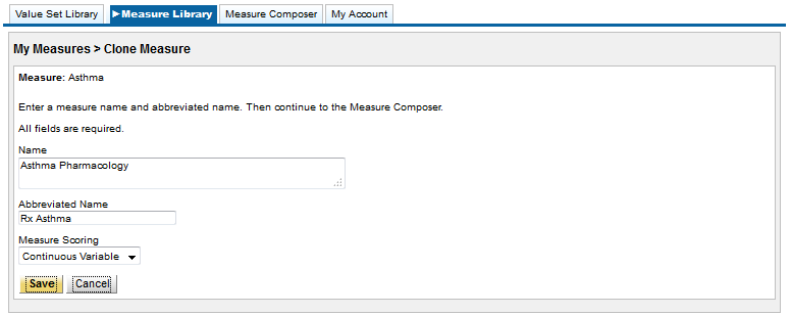
Instructions to clone a measure are listed below:

1. Click the **Clone** icon.

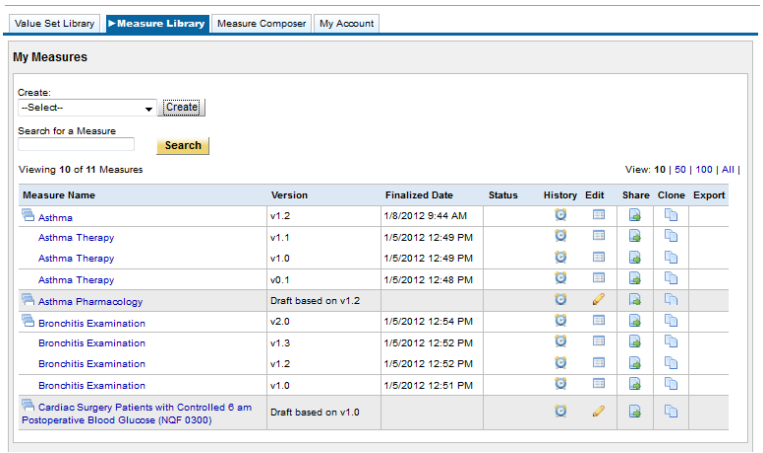


2. Provide a new identity for the cloned measure by entering a **Name, Abbreviated Name, and Measure Scoring** for the new measure.

3. Click **Save**. User will automatically be directed to the Measure Details tab.



Users can modify the logic and value sets of the cloned measure as needed.



X. EXPORT

The last column on the "Measure Library" screen is labeled **Export**. The **Export** function allows the user to retrieve the completed eMeasure and the related spreadsheet of value sets associated with it. The **Export** function is enabled only after all required sections of the eMeasure have been completed and the measure creator indicates it is ready for export. Once the measure creator has "Packaged" the measure (referenced in the "Measure Composer" section of this User Guide), an **Export** icon appears in the **Export** column of the "Measure Library" tab for that measure. The measure creator or users who have been given shared permissions in **Modify** mode can package a measure to make it available for **Export**. Any user with View Only permission to a shared measure can export a packaged measure. Users with Modify permission to a shared measure can create their own measure package and export the measure.

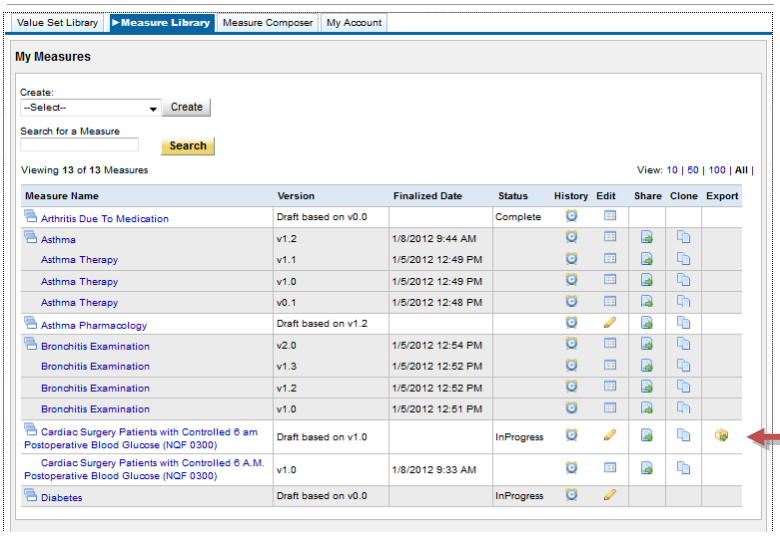
A measure can be ready for **Export** before it is completed. A measure creator may choose to package a draft of a measure before indicating it is complete and export it to others for review. Therefore, the **Export** function is available for measures for which status is still listed as in progress.

When a measure is exported in a minor version format, only the major version number will display in the **Export** file.

Example. If User A has three versions of the Cardiac Surgery measure: Version 1.0, Version 2.0, and Version 2.1 and exports Version 2.1; the export file will state the version number as 2. If the difference between version 2.0 and 2.1 is a spelling correction, this change will be reflected in the version that is exported. In essence, the minor version is exported; however, the number of the version listed will be the major version.

The following provides instructions on how to Export a measure.

1. Select the **Export** icon.



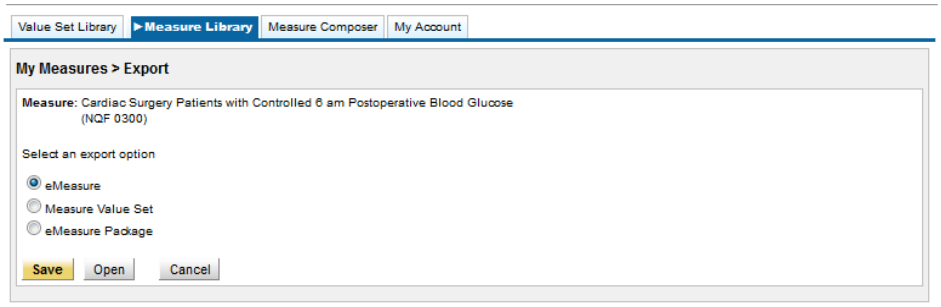
2. Select the radio button on the next screen for the desired output format.

    a. Export options include the **eMeasure** format, **Measure Value Set** Excel format, or an **eMeasure Package**.

        i. The **eMeasure** option exports the measure in 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.

        ii. The **Measure Value Set** option exports in Excel format. It contains all value sets included in the measure, including their identifiers (OIDs), descriptive names, last modified date, QEDM category, 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.

        iii. The **eMeasure Package** format exports both the eMeasure and the Measure Value Set spreadsheet.



A. eMeasure Package

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

- an eMeasure XML;
- an HTML preview of the human readable version of the eMeasure;
- a directory containing a style sheet for opening a human-readable version of the eMeasure; and
- the measure's value sets. Please see Appendix E for the Measure Value Set disclaimer.

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 by selecting on the eMeasure 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 7 or above, or Firefox version 3.0 or above. Other browsers may be used, but they are not supported by the MAT at this time.

B. eMeasure

- To generate the human-readable or HTML version of the eMeasure, select eMeasure and then Open.
- To generate the HQMF XML version of the eMeasure, select eMeasure and then Save. A Save Successful message will display if the user has saved the file successfully.

C. Measure Value Set

A disclaimer (Appendix E) is provided on the first worksheet of the Measure Value Set file.

The second worksheet of the measure value set provides all value sets included in the measure, including their identifiers (OIDs), descriptive names, code systems used, and all of the concepts (as codes with descriptors) in each value set. Value Sets with a Last Modified date and time entry and that are closest to but do not exceed the Value Set Package date entered by the user in the Measure Packager, are included in the Value Set Export. The output of the measure value set is in an Excel format. The second worksheet of the measure value set 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 third 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 Packager".

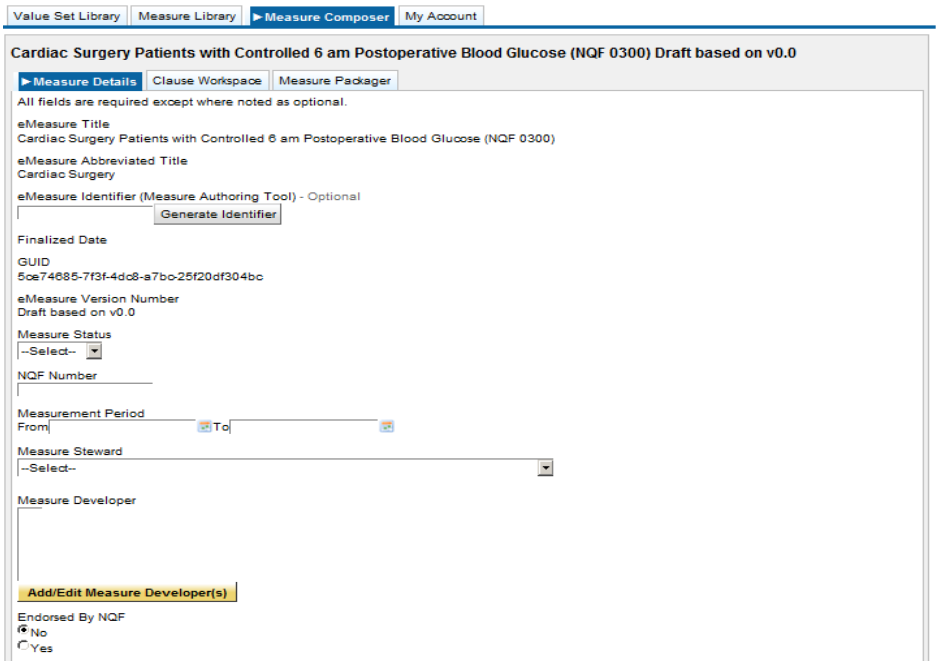
- ***Note:*** *If a user has created a measure package but an export icon does not display in the "Measure Library," the user should check to make sure that all clauses in the Clause Workspace have been completed. Saving partial clauses will prohibit export.*

Chapter 8

Chapter 8: Measure Composer—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.*

The "Measure Details" sub-tab is where all of the metadata for a measure is entered. To save work on the "Measure Details" sub-tab, a **Save** button can be accessed in the bottom left-hand corner of the page. A keyboard shortcut of **Ctrl+Alt+s** also is available to save the "Measure Details" page of the MAT manually. Upon successfully saving work, a confirmation message displays.



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

All fields are required, except for the 'eMeasure Identifier (Measure Authoring Tool)' field.

Copy and pasting from other documents should be done with caution. 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 as 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 complete before creating a measure package for export.*

- ***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 screen. To change the name or abbreviated name, click the **Edit** icon for the measure on the "Measure Library" screen. Detailed instructions can be found here.

II. eMeasure IDENTIFIER (MEASURE AUTHORING TOOL)

The eMeasure Identifier (Measure Authoring Tool) field is optional. When ready to assign an eMeasure Identifier, the user can **Click** on 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.

III. 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.

IV. GUID

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 number assigned by the MAT that is required by the HL7 HQMF standard.

Example. The GUID for the measure NQF 0300 provided by the measure steward, OFMQ is A339C2CF-3077-4ED3-B07D-424611FE185B.

V. eMeasure VERSION NUMBER

The **eMeasure Version Number** field is a read-only field that identifies the major and minor integers of the version number. Only integers display in the field as a requirement of the HL7 HQMF standard. Therefore, minor versions of a measure will display only the major version integer to which they apply (e.g., Version 1.3 will display as Version 1).

Example. The eMeasure version number for the measure NQF 0300 provided by the measure steward, OFMQ is 1.

VI. MEASURE STATUS

The **Measure Status** field options are **Complete** and **In Progress**. Users may change this field to **Complete** if desired. Leave the Status set to **In Progress** if the measure is being edited or will change or finish at a later time. This will help users more easily identify anything that they have not completed. At this time the Status field does not drive any other action or status in the MAT nor will it appear in the measure export. This field is present only to assist users in building phrases.

VII. 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."

Example. The NQF number for the measure NQF 0300 provided by the measure steward, OFMQ is 0300.

- ***Note:** DO NOT enter any spaces into this field, as it will cause an invalid HQMF eMeasure file.*

VIII. MEASUREMENT PERIOD

Enter the measurement period's **From** and **To** dates, or click the **Calendar** icon to select the date from a calendar. "X" can also be entered for the last two digits of the year.

Example. The measurement period for the measure NQF 0300 provided by the measure steward, OFMQ is January 1, 20xx and December 31, 20xx.

IX. MEASURE STEWARD

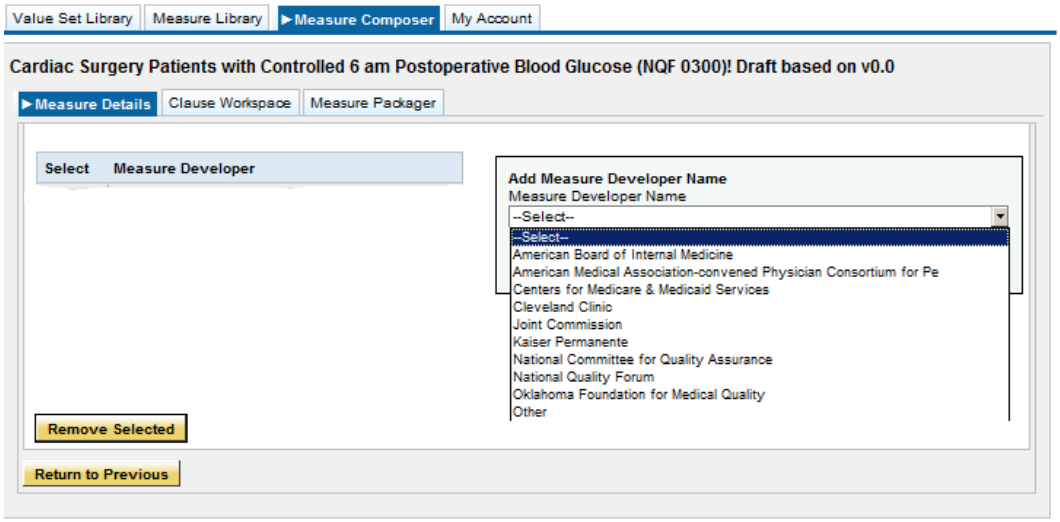
The **Measure Steward** is the organization responsible for the measure content and maintenance. Select a measure steward from the list of available options or select **Other** to enter a **Measure Steward** name. If the user selects **Other**, a value must be entered for the **Measure Steward** field.

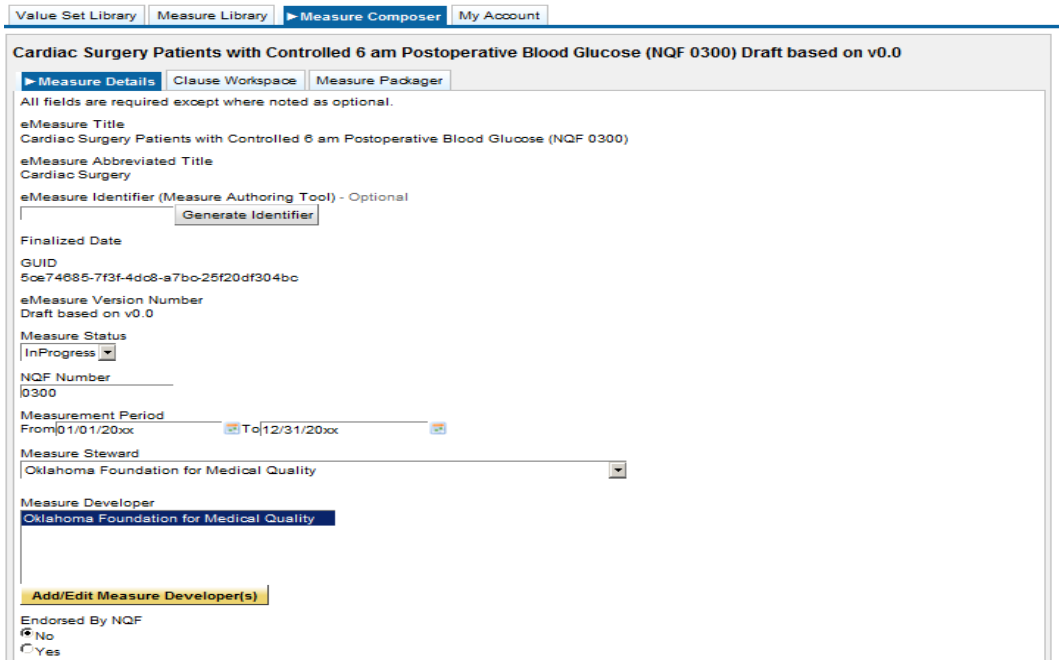
Example. The measurement steward for the measure NQF 0300 is the Oklahoma Foundation for Medical Quality.

X. MEASURE DEVELOPER

Click on **Add/Edit Measure Developer(s**) to select one or many Measure Developers. This represents the humans or organizations that authored the quality measure. If the Measure Developer is not listed, please select **Other** in the alphabetized list and then further specify the name of the measure development organization or person.

Example. The measurement developer for the measure NQF 0300 is the Oklahoma Foundation for Medical Quality.





XI. ENDORSED BY NQF

Select the appropriate radio button to indicate whether or not the measure is currently endorsed by NQF.

Example. NQF 0300 is endorsed by NQF. Therefore, this field can be selected for this measure.

XII. DESCRIPTION

Enter a general description of the measure intent.

Example. The following is a sample description OFMQ uses for measure NQF 0300: Cardiac surgery patients with controlled 6 A.M. blood glucose (less than or equal to 200 mg/dL) on postoperative day one (POD 1) and postoperative day two (POD 2) with Anesthesia End Date being postoperative day zero (POD 0).

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."

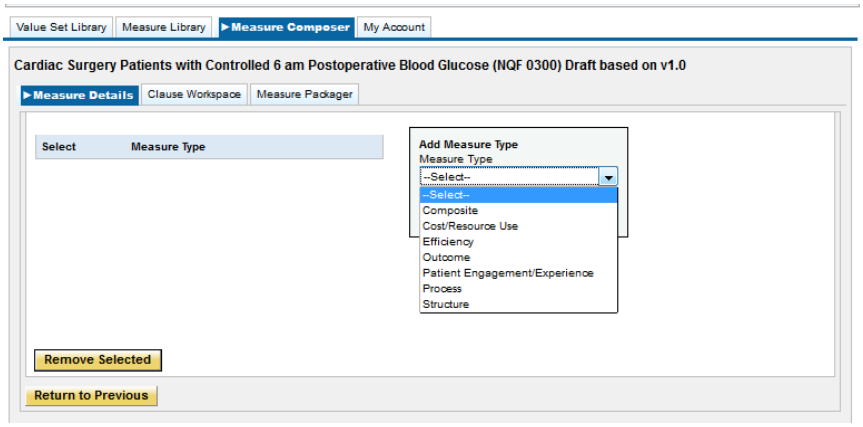
XV. MEASURE SCORING

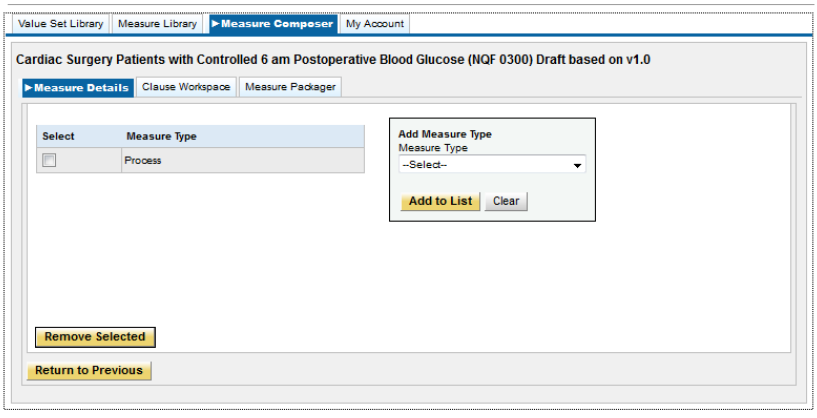
The **Measure Scoring** field automatically displays the type of measure scoring that was entered at the time the measure was created. This cannot be changed on the Measure Details screen. To change the type of measure scoring, click the **Edit** icon for the measure on the "Measure Library" tab.

XVI. MEASURE TYPE

Click on **Add/Edit Measure Type** to assign one or many measure types. The Measure Type indicates whether the eMeasure is used to examine a process or an outcome over time.

Example. NQF 0300 is a process measure.





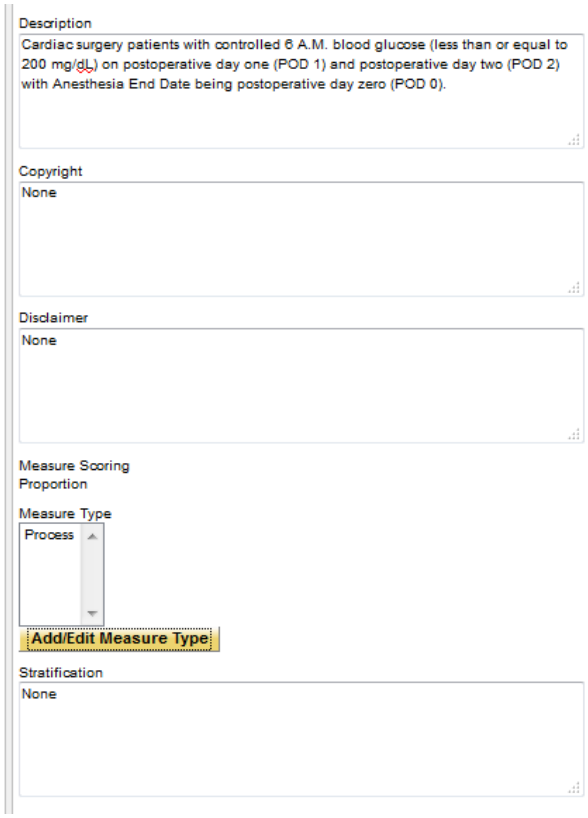
XVII. STRATIFICATION

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

For eMeasures that do not have Stratification information, enter "None."

For more information on Stratification, click here.

*Example. OFMQ did not use any **Stratification** for NQF 0300. Hence, "None" is entered in this field for this measure.*



XVIII. RISK ADJUSTMENT

Enter a description of the **Risk Adjustment** for the eMeasure. 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."

*Example. OFMQ did not use any **Risk Adjustment** for NQF 0300. Hence, "None" is entered in this field for this measure.*

XIX. 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."

XX. RATIONALE

Enter a general description of the evidence used by the expert panel who created the measure to develop the logic. 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.

*Example. The **Rationale** provided by OFMQ for measure NQF 0300 is: Hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions. In a study by Zerr, et al (1997), the risk of infection was significantly higher for patients undergoing coronary artery bypass graft (CABG) if blood glucose levels were elevated. Furthermore, Zerr, et al (2001), demonstrated that the incidence of deep wound infections in diabetic patients undergoing cardiac surgery was reduced by controlling mean blood glucose levels below 200mg/dL in the immediate postoperative period. Latham, et al (2001), found that hyperglycemia in the immediate postoperative phase increases the risk of infection in both diabetic and nondiabetic patients and the higher the level of hyperglycemia, the higher the potential for infection in both patient populations. A study conducted in Leuven, Belgium (Van den Berghe, 2001), demonstrated that intensive insulin therapy not only reduced overall in-hospital mortality but also decreased blood stream infections, acute renal failure, red cell transfusions, ventilator support, and intensive care. Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients.*

XXI. 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.

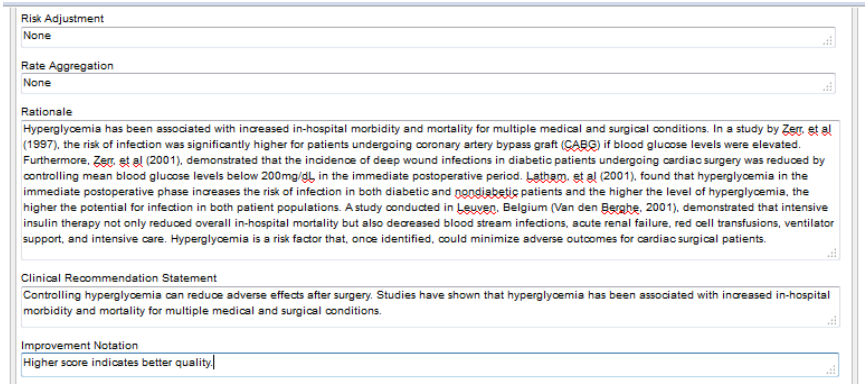
*Example. The **Clinical Recommendation Statement** provided by OFMQ for measure NQF 0300 is: Controlling hyperglycemia can reduce adverse effects after surgery. Studies have shown that hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions.*

XXII. 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).

For eMeasures that do not have Improvement Notation information, enter "None."

*Example. The **Improvement Notation** provided by OFMQ for measure NQF 0300 is: Higher score indicates better quality.*



XXIII. 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.

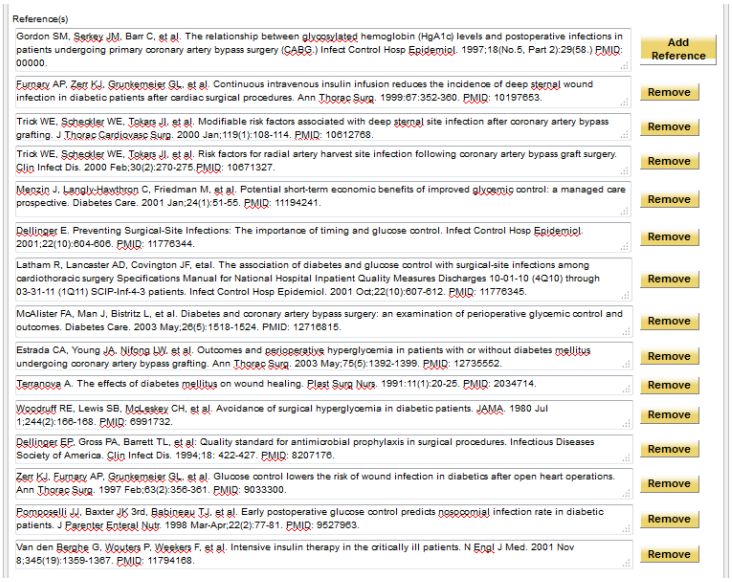
To add more than one reference, select **Add Reference**.

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

*Example. A sample of **References** provided by OFMQ for measure NQF 0300 is*

- *Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. Ann Thorac Surg. 1999:67:352-360. PMID: 10197653.*
- *Golden SH, Peart-Vigilance C, Kao WH, et al. Perioperative glycemic control and the risk of infectious complications in a cohort of adults with diabetes. Diabetes Care. 1999 Sep;22(9):1408-1414. PMID: 10480501.*
- *Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. J Thorac Cardiovasc Surg. 2000 Jan;119(1):108-114. PMID: 10612768.*

Please keep in mind that each reference should be added separately so the references appear as separate rows in the eMeasure output.



XXIV. DEFINITION

Enter a definition or description of individual terms, if needed.

For measures that do not have Definition information, enter None.

XXV. 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 eMeasures that do not Guidance information, enter None.

*Example. OFMQ provides the following **Guidance** for measure NQF 0300:*

Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec.

Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure.

General guidance:

The original measure excludes patients who have had a laparoscopic procedure unless the laparoscopic incision has been extended during the procedure. ICD-10 allows definition of such extension with procedure codes; ICD-9 does not. For those using ICD-9 any laparoscopic procedure that extends the incision should be included. In this measure the value sets that describe types of surgical procedures remain only in ICD-9 or ICD-10 because the concepts that apply are limited to a very specific subset of all surgical procedures.

Exclusion element guidance:

The exclusion for patients who are clinical trial participants is limited to patients participating in a clinical trial for the same conditions as covered by the measure. Other clinical trials are not valid reasons for exclusions.

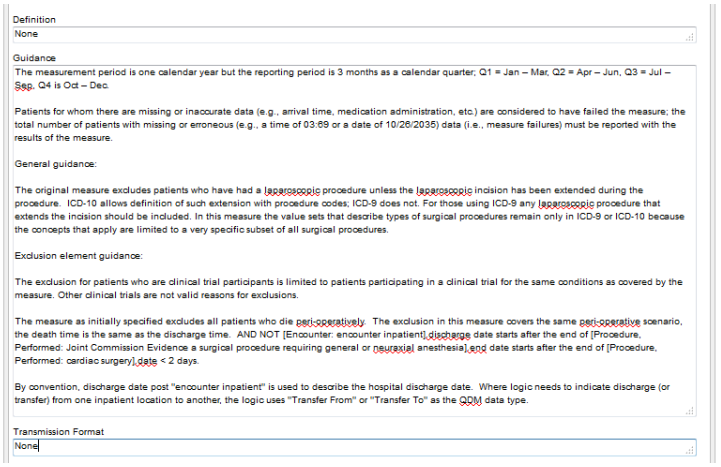
The measure as initially specified excludes all patients who die peri-operatively. The exclusion in this measure covers the same peri-operative scenario, the death time is the same as the discharge time. AND NOT [Encounter: encounter inpatient].discharge date starts after the end of [Procedure, Performed: Joint Commission Evidence a surgical procedure requiring general or neuraxial anesthesia].end date starts after the end of [Procedure, Performed: cardiac surgery].date < 2 days.

By convention, discharge date post "encounter inpatient" is used to describe the hospital discharge date. Where logic needs to indicate discharge (or transfer) from one inpatient location to another, the logic uses "Transfer From" or "Transfer To" as the QDM data type.

XXVI. TRANSMISSION FORMAT

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

For eMeasures that do not have Transmission Format information, enter None.



XXVII. INITIAL PATIENT POPULATION

Enter a description of the initial patient population for the eMeasure. The initial patient population refers to all patients to be evaluated by a specific performance eMeasure. The initial patient popoulation 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.

Example. The initial patient population for measure NQF 0300 is:

- *everyone who was*
  - *at least 18 years old before the inpatient cardiac surgery procedure,*
  - *discharged from the inpatient cardiac surgery procedure during the measurement period, and*
  - *admitted for the inpatient cardiac surgery procedure for at most 120 days.*

XXVIII. DENOMINATOR

Enter a description of the denominator for the eMeasure. It can be the same as the initial patient population or a subset of the initial patient 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. Continuous Variable eMeasures do not have a Denominator, but instead define a Measure Population.

For continuous variable eMeasures, enter "Not Applicable."

Example. The denominator population for measure NQF 0300 is:

- *everyone who was*
  - *in the initial patient population, and*
  - *had an inpatient cardiac surgery procedure start time that began after the inpatient encounter, and*
  - *excludes anyone with an infection that started before the inpatient cardiac surgery procedure, and*
  - *excludes anyone with a burn diagnosis during the inpatient cardiac surgery procedure, and*
  - *excludes anyone who had a transplant before the inpatient cardiac surgery procedure.*

XXIX.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.

For proportion or ratio eMeasures that do not have Denominator Exclusions, enter "None."

For continuous variable eMeasures, enter "Not Applicable."

Example. The denominator exclusions for measure NQF 0300 is:

- everyone who was
  - *a clinical trial participant during the inpatient hospital encounter, or*
  - *expired before the inpatient cardiac surgery procedure, and*
  - *expired less than 6 hours after the inpatient cardiac surgery procedure that required general or neuraxial anesthesia, or*
  - *discharged from the inpatient hospital encounter less than 2 days after the inpatient cardiac surgery procedure*

The last four items listed under the denominator were populations excluded from the denominator. Please note that these four denominator populations could have been placed as denominator exclusion.

XXX. NUMERATOR

Enter a description of the numerator 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

For continuous variable eMeasures, enter "Not Applicable."

Example. The numerator population for measure NQF 0300 is:

- *everyone who was*
  - *tested for blood glucose level one day after the inpatient cardiac surgery procedure that required general or neuraxial anesthesia, and*
  - *tested for blood glucose level two days after the inpatient cardiac surgery procedure that required general or neuraxial anesthesia.*

XXXI.NUMERATOR EXCLUSIONS

Enter a description of the numberator exclusions for the eMeasure. Numerator Exclusions are used only in ratio eMeasures to define instances that should not be included in the numerator data.

For ratio eMeasures that do not have Numerator Exclusions, enter "None."

For continuous variable or proportion eMeasures, enter "Not Applicable."

Example. Since NQF 0300 is a proportion measure, this measure cannot have numerator exclusions. Therefore, "N/A" will be entered in this field.

XXXII. 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 or continuous variable 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 eMeasures that do not have Denominator Exceptions, enter "None."

For ratio or continuous variable eMeasures, enter "Not Applicable."

Example. Since NQF 0300 is a proportion measure, this measure cannot have denominator exceptions. Therefore, N/A will be entered in this field.

XXXIII. 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).

For ratio or proportion eMeasures, enter "Not Applicable."

Example. Since NQF 0300 is a proportion measure, this measure cannot have a measure population. Therefore, N/A will be entered in this field.

XXXIV. MEASURE OBSERVATION

Enter a description of the measure observations for the eMeasure. Measure observations are used only in continuous variable eMeasures. They provide the description of how to evaluate performance. Measure observations are generally described using a statistical methodology such as: count, etc.

For ratio or proportion eMeasures, enter "Not Applicable."

Example. Since NQF 0300 is a proportion measure, this measure cannot have measure observations. Therefore, N/A will be entered in this field.

XXXV. 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 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.

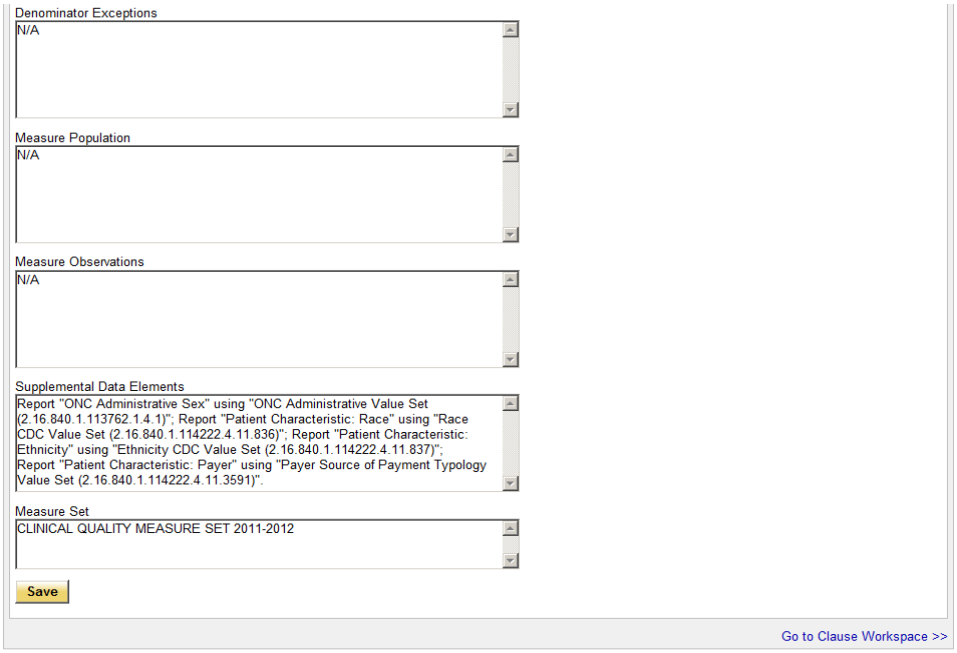
Additional supplemental data elements required for risk adjustment or other purposes of data aggregation can be included in the Supplemental Data Element section.

Example. OFMQ uses the supplemental data elements provided by CMS for measure NQF 0300. The following is entered in this field: Report "ONC Administrative Sex" using "ONC Administrative Sex Value Set (2.16.840.1.113762.1.4.1)"; Report "Patient Characteristic: Race" using "Race CDC Value Set (2.16.840.1.114222.4.11.836)"; Report "Patient Characteristic: Ethnicity" using "Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)"; Report "Patient Characteristic: Payer" using "Payer Source of Payment Typology Value Set (2.16.840.1.114222.4.11.3591)".

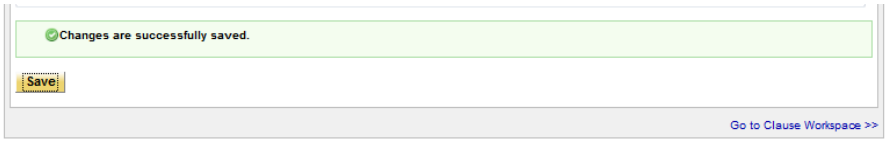
XXXVI. MEASURE SET

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).

*Example. The **Measure Set** for NQF 0300 is: CLINICAL QUALITY MEASURE SET 2011-2012.*



Upon saving information entered in the "Measure Details" sub-tab successfully, click on **Go To Clause Workspace** to proceed to the build the system clauses and logic in the measure.



Chapter 9

Chapter 9: Measure Composer—Clause Workspace

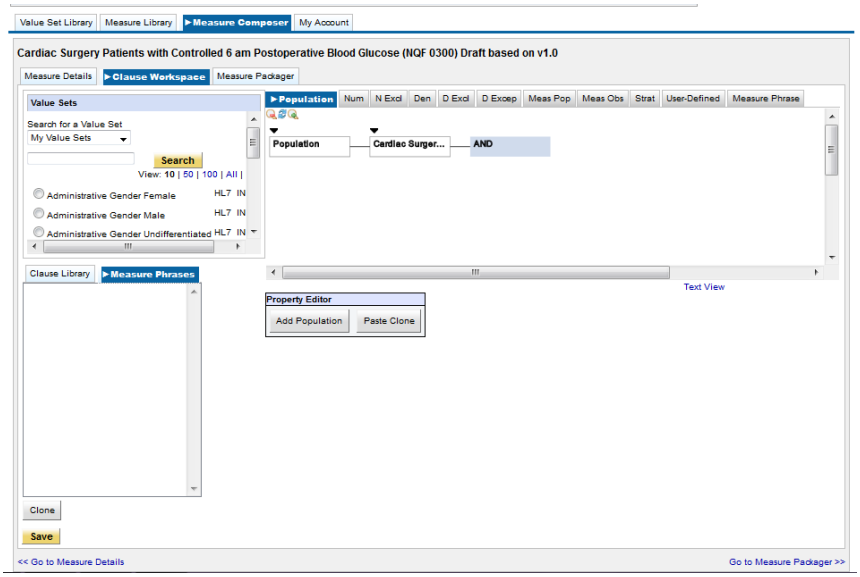
> 🗁 ***Chapter Overview:***
> *This chapter describes the Clause Workspace features. Users will be guided through the steps to write measure statements using individual quality data elements, to specify relationships among elements, and to apply the required logic to describe the measure in detail. In addition, users will learn how to create logic statements or measure phrases and to define measure components or system clauses (population, numerator, numerator exclusion, denominator, denominator exclusion, denominator exception, measure population, measure observation, and stratification).*

The "Clause Workspace" sub-tab displays the **System Clauses** (population, numerator, denominator, etc.) in the right two-thirds of the screen, **Value Sets** box in the upper left corner of the screen, the **Clause Library** and **Measure Phrases** tabs in the lower left corner of the screen, and the **Property Editor** box on the bottom of the screen. Detailed functions for each section of the screen are described below.

This Chapter is divided in four sections that flow sequentially when building a measure. Each section is listed and described below.

I. System Clause Building: This section describes how to build phrases in the system clause via the bottom-up, and top-down approach; and how to view phrases in the canvas and text view. This section also reviews phrase nesting.
II. Value Sets Box: This section describes how to create QDM elements for measure and more specifically, how to apply QDM Categories and Attributes to value sets.
III. System Clause Sub-Tabs: This section provides detailed information about each of the system clauses.

IV. Measure Clauses/Measure Phrases Box: This section provides an overview of the purpose of the clause library and measure phrases and details on how to clone a clause.



I. SYSTEM CLAUSE BUILDING

As previously described, the Measure Authoring Tool's (MAT) "Clause Workspace" allows users to define each system clause of a measure. To build a system clause, users must understand how to build phrases and nest clauses that are paired and nested. This section will describe how to complete these basic tasks.

A. Phrase Nesting

A phrase is a subcomponent of logic that can be used in a clause. When building phrases in the MAT, the user must select the system clause to build the phrase. Appendix D lists 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. The **Measure Phrase** sub-tab allows users to use the canvas to create phrases and later apply those phrases to different sub-tabs.

The **User-Defined** sub-tab provides an area where users can copy clauses and rename them to give them more descriptive titles. The **User–Defined** sub-tab provides an area where a user can paste and edit portions of other clauses to save as a user-defined clause. Any clause in the **User-Defined** sub-tab can be used across all measures to which the user has access. This sub-tab can be used as a workspace for users to build clauses.

The **Measure Phrase** sub-tab provides an area for users to build new measure phrases. Click here to learn how to apply phrases built in the **Measure Phrase** sub-tab to a system clause.

Phrases can be reused as needed in the same measure. However, individual measure phrases cannot be cloned for use in another measure. All clauses the user creates are available for reuse in the workspace; the list is not limited to those clauses in the current measure.

After selecting the system clause sub-tab in which the user would like to create a phrase, the user must decide what should be stated in the clause sub-tab. To portray the correct timing of events and make the logic clear, users first need to build the appropriate QDM elements and then build a phrase by connecting the QDM elements to each other with an "AND," "OR," or a relative timing.

💻 *Example.* In NQF 0300, the phrases for the system clause sub-tabs are defined as follows:

- ***Initial Patient Population =***
  - *AND: DOB >=18 yrs starts before start of Occurrence A of Inpatient Encounter*
  - *AND: Occurrence A of Inpatient Encounter (discharge datetime) during Measurement period*
  - *AND: Occurrence A of Inpatient Encounter (length of stay <= 120 day(s))*

The Initial Patient Population does not have any nested phrases. All phrases are paired.

- ***Denominator =***
  - *AND: Initial Patient Population*
  - *AND: Occurrence A of Cardiac Surgery (ordinality = principal) >= 1 minute(s) starts after start of Occurrence A of Inpatient Encounter*
  - *AND NOT: Active Infection >= 1 minute(s) starts before start of Occurrence A of Cardiac Surgery (incision datetime) during Occurrence A of Inpatient Encounter (admission datetime)*
  - *AND NOT: Infection diagnosis (ordinality = principal) during Occurrence A of Inpatient Encounter*
  - *AND NOT: Burn diagnosis (ordinality = principal) during Occurrence A of Inpatient Encounter*
  - *AND NOT: Active Transplant starts before start of Occurrence A of Inpatient Encounter*

- ***Denominator Exclusions =***
  - *AND:*
    - *OR: Clinical trial participant during Occurrence A of Inpatient Encounter*
    - *OR:*
      - *AND: Expired starts after start of Cardiac Surgery (incision datetime)*
      - *AND: Expired <= 6 hour(s) starts after end of Occurrence A of Procedure with anesthesia Performed during Occurrence A of Inpatient Encounter*

- *OR: Occurrence A of Inpatient Encounter(discharge datetime) < 2 day(s) starts after start of Occurrence A of Cardiac Surgery (ordinality = principal)*

The Denominator Exclusions has phrases that are both paired and nested. The "OR" statements are paired and the second "OR" statement has two "AND" statements that are nested.

- ***Numerator =***
  - *AND: Glucose lab test (result <= 200 mg/dL) = 1 day(s) starts after end of Occurrence A of Procedure with anesthesia Performed during Occurrence A of Cardiac Surgery*
  - *AND: Glucose lab test (result <= 200 mg/dL) = 2 day(s) starts after end of Occurrence A of Procedure with anesthesia Performed during Occurrence A of Cardiac Surgery*

The Numerator does not have any nested phrases. All phrases are paired.

- ***Note:** Phrase Nesting—Due to HQMF eMeasure constraints, the use of relative timings should be limited to the right-hand side of a clause. When nesting phrases, the first phrase element should always be either a QDM element or a measure phrase that does not use a relative timing or a function.*

Phrases can be nested at any level in the tree on the canvas.

Example. The following is an example of this type of tree nesting:

Phrase1
AND: Phrase2
Phrase3
Phrase4
OR: Phrase5
Phrase6

In reading the intent of the above, it would interpret as "Phrase1 AND Phrase2 AND Phrase3 AND (Phrase4 OR Phrase5 OR Phrase6)." Note that phrases 4, 5, and 6 are nested under phrases 1, 2, and 3.

Example. Another example of nesting:

Phrase1
AND: Phrase2
Phrase3
Phrase4
OR: Phrase5

Phrase 6
Phrase7
AND: Phrase8
Phrase9

The above would be interpreted as "Phrase1 AND Phrase2 AND Phrase3 AND (Phrase4 OR Phrase5 OR Phrase6) OR (Phrase7 AND Phrase8 AND Phrase9)." Note that phrases 4, 5, and 6 are nested under phrases 1, 2, and 3, and phrases 7, 8, and 9 are nested under phrases 4, 5, and 6.

There are two main options for building a system clause: top-down or bottom-up. A hybrid of the two approaches also could be used. The top-down approach is when a user creates their measure phrases while in the canvas whereas the bottom-up approach is when a user creates measure phrases using the Measure Phrase sub tab, and then adds the phrases to the canvas later.

B. Top-Down System Clause Building

The Top-Down approach allows a user to build the measure phrases in the system clause canvas from the start. Building a system clause through this approach may require a little more forethought on how the phrases will need to be connected on the system clause tree as the user builds them.

To build a system clause from the **Top-Down** approach, follow the instructions below:

1. Click the desired **System Clause** sub-tab. The canvas area will appear.

2. Click the **AND** rectangle so it is highlighted yellow. If phrases need to be connected by an **OR**, Click **OR** in the **Property Editor**. An **OR** rectangle will display now connected to the Top-Level **AND**.

3. Click **New Phrase** in the **Property Editor**. The phrase building workspace displays at the bottom of the page.

4. Build all applicable components of the phrase (e.g., **Name**, **Status**, **Phrase Elements**, **Condition**, **Attribute**, **Function**, **Operator**, **Quantity**, and **Unit**) then click **Save Phrase**. A "Save Successful" message will display if saved successfully. The measure phrase displays in the canvas area following the **AND** or **OR** rectangle.

If the user needs to build a phrase with a smaller nested phrase, first build the smaller phrase that will be nested. To do this:

1. Open the **Measure Phrase** sub tab and click **New Phrase**. The **Measure Phrase** building workspace displays.

2. Build the desired phrase, then click **Save**. The phrase displays in the **Measure Phrases** box in the lower left corner. It also will be available for

selection in the Phrase Element drop down menu of the **Property Editor** when the **Measure Phrases** radio button is selected.

3. Open the desired System Clause sub tab and click the appropriate **AND** or **OR** rectangle so that it is highlighted yellow.

4. Click **New Phrase** in the **Property Editor**. The phrase building workspace displays at the bottom of the page.

5. Build the phrase as desired. Note that when building the new phrase, the smaller nested phrase will display in both of the Phrase Element drop-down fields when the **Measure Phrases** radio button is selected.

   A. If the nested phrase that the user built above contains any type of timing relativity (e.g., Starts Before or During, Starts after Start Of, etc.); it should be used only in the second Phrase Element field on the right side of the phrase. It should not be selected in the first Phrase Element field.

6. When finished building the phrase, click **Save Phrase**. A "Save Successful" message will display if saved successfully.

As with **Bottom-Up** System Clause building (see below), users can continue adding phrases to the top-level **AND** or if the users need to nest phrases deeper than the top-level of the tree, the users can add **ANDs** or **ORs** to the top level **AND**.

C. Bottom-Up System Clause Building

To build a system clause from the **Bottom Up**, the user will build the smallest of measure phrases, build larger measure phrases consisting of the smaller measure phrases if needed, and then finally connect the measure phrases together with the appropriate operators.

First, users will need to identify the smallest measure phrases that can be built in the MAT. Although the MAT cannot protect users from making clinically illogical phrases, it will assist in building correctly formatted phrases. It does this by filtering the options based on the user's selections as they build a phrase.

Example. If a user starts a phrase with a QDM element and selects AND as the operator, the user will be limited to only adding additional QDM elements or phrases connected with ANDs in that phrase. Users will not be able to add a timing comparator onto the end of the phrase.

The canvas area is used for building system clauses. System clauses (population, numerator, numerator exclusions, denominator, denominator exclusions, denominator exceptions, measure population, and measure observation) are made up of several phrases connected with ANDs or ORs.

To build system clauses using measure phrases built in the Measure Phrase sub-tab, follow the instructions below:

1. Click the desired **System Clause sub-tab** (e.g., Population, Numerator, etc.) to open the canvas area for the selected system clause. By default, a placeholder rectangle for the first system clause displays (e.g., measure name_Population1) as well as a top-level **AND**. Every system clause must begin with a top-level **AND**.

2. Click the **AND** rectangle so that it is highlighted yellow. If phrases need to be connected by an **OR**, Click **OR** in the **Property Editor**. An **OR** rectangle will display now connected to the Top-Level **AND**. In the **Property Editor** box at the bottom of the screen, click **Existing Phrase**. A **Phrase** drop-down menu, containing the list of phrases that have been created for the measure, displays at the bottom of the screen.

3. Select the desired phrase and click **OK**. A rectangle containing the phrase name displays attached to the AND or OR in the canvas area.

4. To view the contents of a phrase, click the arrow above the phrase rectangle. The rectangle will expand, and when hovering the tooltip over the box, the entire contents of the phrase will display.

5. To connect another phrase to the top-level AND, click the **AND** rectangle so that it is highlighted.

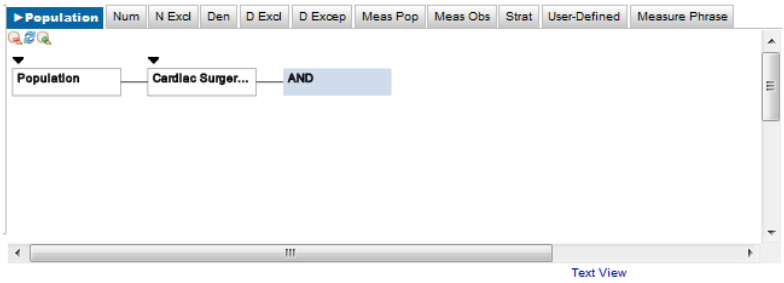
6. Click **Existing Phrase** at the bottom of the screen.

7. Select the desired phrase in the **Phrase** drop-down menu and click **OK**. A rectangle containing the phrase name will appear attached to the **AND** or **OR**, below the first phrase that the user added.

8. Users can continue adding phrases to the top-level **AND** rectangle, or nest phrases deeper than the top level of the tree on the canvas, by using additional **ANDs** or **ORs** to the top level **AND** rectangle.

D. Text View

The default view for the “Clause Workspace” is the **Canvas View**. A **Text View** also is available within the MAT and provides a tree diagram of the measure sub-tabs. It is a 508-compliant mechanism for users to build measures using the bottom-up approach. Users can access the Text View by clicking on the **Text View** link below the sub-tabs in the “Clause Workspace.”



- ***Note:*** *Measures created in the Canvas View can be viewed in the Text View. However, if logic within a system clause includes components other than measure phrases of a top level AND they will only be able to be modified in the Canvas View. Therefore, it is recommended that measures created in the Canvas View be modified in the Canvas View only.*

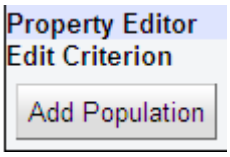
Once in the Text View, expand the tree diagram by clicking on the **+** sign next to the Measure Name or using the right arrow button.

- Navigation techniques for the Text View:

1. The up arrow key navigates the user to the next level up in the tree diagram.
2. The down arrow key navigates the user to the next level down in the tree diagram.
3. The right arrow key expands the tree diagram if there are additional levels to display.
4. The left arrow key contracts the tree diagram if there are levels displayed that can be contracted.
5. The tab key moves the focus from the Text View and the tree diagram displayed to the Property Editor.
6. The tab key navigates through additional buttons in the **Property Editor**.
7. The enter key selects the **Property Editor** button.

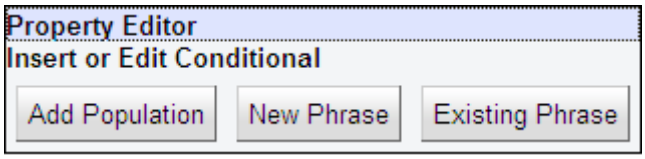
The **Text View** displays a tree diagram of the System Clause sub-tabs: Population, Numerator, Numerator Exclusions, Denominator, Denominator Exclusions, Denominator Exceptions, Measure Population, and Measure Observation.

- Adding System Clauses in Text View



To add **System Clauses**, navigate to the system clause, and using the Property Editor, select Add <System Clause Name> where the system clauses are Population, Numerator, Denominator, Exclusions, Exceptions, Measure Population and Measure Observation.

- Adding Measure Phrases in Text View



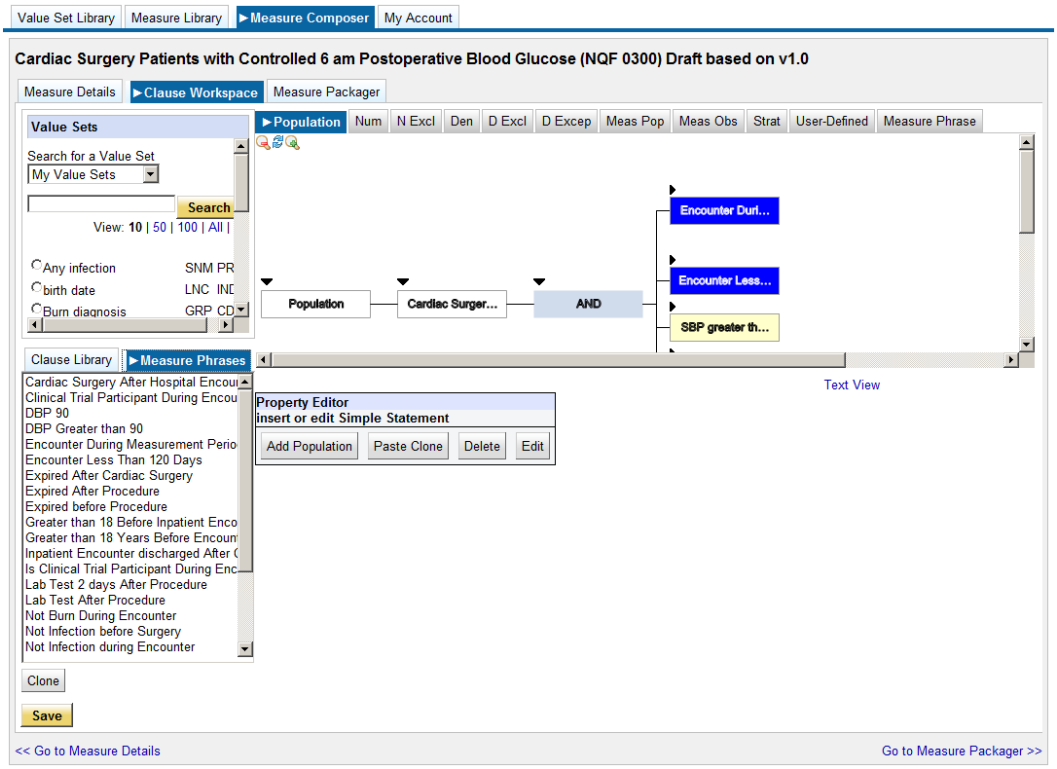
To add a measure phrase, navigate to a top level **AND** within the tree diagram; using the **Property Editor**, select **New Phrase** or **Existing Phrase**.

Selecting **New Phrase** displays the **Property Editor** so the name and logic for a new phrase can be entered.

Selecting **Existing Phrase** displays the available measure phrases for that measure. Users should select the desired phrase and then select **OK**.

II. VALUE SETS BOX

The **Value Sets** box displays value sets based upon the selected filter (**My Value Sets**, **All Value Sets**, and **Applied Value Sets**).

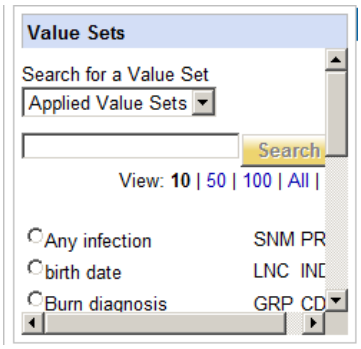


Users can determine the values sets to display on the screen by first selecting a preferred filter (**My Value Sets**, **All Value Sets**, or **Applied Value Sets**) from the drop down box at the top of the **Value Sets** box and then clicking the **Search** button. The filter will be defaulted to **My Value Sets**.

- The **My Value Sets** filter displays the most recent name for each value set created by the signed-in user, whether the value sets are in draft mode or saved as complete.

- The **All Value Sets** filter the most recent name of all values sets, including those created by the signed-in user as well as value sets created by other users, whether the value sets are in draft mode or saved as complete.

- The **Applied Value Sets** filter displays the most recent name of only those value sets for which the signed-in user has used to create a QDM element, whether the value sets are in draft mode or saved as complete, regardless of the value set creator.



The default value sets are “Birth Date”, “Female,” “Male”, and “Unknown Sex”

Users can determine the number of value sets to be displayed on the screen by selecting a preferred number (10, 50, 100, or All).

When creating a QDM element, a user views the Value Set Name in the **Value Set** box one time, regardless of the number of iterations and drafts there may be. The list is presented in three columns. The first column shows the **Name** of the **Value Set** with a radio button to the left of the name (the radio button is used to select the value set for use). The second column shows the abbreviation for the **Code System** used to develop the value set (note that groupings of value sets show the GRP abbreviation). The third column shows the **QDM category** associated with the value set. The **Code System** and **QDM category** abbreviations are listed in the table 1 and table 2 below.

Table 1. Code Abbreviation and Code System

Code System Abbreviation	Code System
ASC	Accredited Standards Committee
CPT	Codified Procedural Terminology
CVX	Codes for Vaccine Administered
GMD	Global Medical Device Nomenclature
HCP	Healthcare Common Procedure Coding System
HL7	Health Level 7
I9	International Classification of Diseases, 9th Revision, Clinical Modification
I10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
ICF	International Classification of Functioning
ISO	International Organization for Standardization
LNC	Logical Observation Identifiers Names and Codes
VAD	PHIN Vocabulary Access and Distribution System (VADS)
RxN	RxNorm
SNM	Systematized Nomenclature of Medicine—Clinical Terms
UCM	Unified Code for Units of Measure
UMD	Universal Medical Device Nomenclature System

Table 2. QDM Category and Abbreviations

QDM Category Abbreviation	QDM Category
ATT	Attribute
CDP	Condition/Diagnosis/Problem
COM	Communication
DEV	Device
DXS	Diagnostic Study
ENC	Encounter
EXP	Care Experience
FXS	Functional Status
GOL	Care Goal
IND	Individual Characteristic
INT	Intervention
LAB	Laboratory Test
MED	Medication
PE	Physical Exam
PRC	Procedure
RSK	Risk Category/Assessment
SUB	Substance
SX	Symptom
SYS	System Characteristic
TRN	Transfer of Care

The Value Set box is pre-populated with ready-to-use administrative Sex value sets, and birth date value set.

The codes within each of the pre-populated value sets are displayed in Table 4 below.

Table 3. QDM Category, Code System, Code, and Descriptors for Pre-Populated Value Sets

Value Set Name	QDM Category	Code System	Code System Version	Code	Descriptor
Male	Individual Characteristic	Administrative Sex	HL7 v2.5	M	Male
Female	Individual Characteristic	Administrative Sex	HL7 v2.5	F	Female
Sex Unknown	Individual Characteristic	Administrative Sex	HL7 v2.5	U	Unknown

Value Set Name	QDM Category	Code System	Code System Version	Code	Descriptor
Birth Date	Individual Characteristic	LOINC	2.36	21112-8	Birth date

A user may **Apply a Data Type** to any of the value sets except for those that are attributes (ATT) and the three measurement timing elements. By applying a data type, users create a Quality Data Model (QDM) element for use in building a measure. Attribute value sets are applied to a measure in to further define a QDM element. Therefore, the attributes do not require assignment of a data type.

Although attributes are not a specific QDM category, ATT (for attribute) is listed in the QDM category options to allow a user to create value sets to define measure element attributes. Attributes include additional data 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).

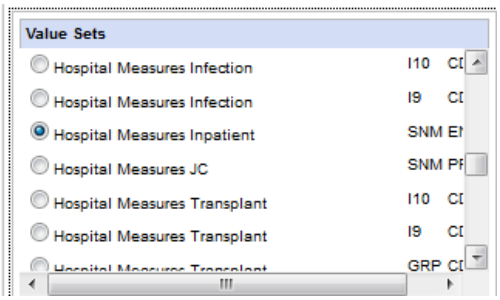
The following sections describe how to create a QDM element for a measure and how to select an attribute value set for use in a measure.

A. Create a QDM Element for the Measure

1. Select the radio box next to the desired value set. The most recent name of the value set will display in the **Value Set List**. The user should select the appropriate value set search option (**My Value Sets**, **Applied Value Sets**, or **All Value Sets**) to list the desired value set.

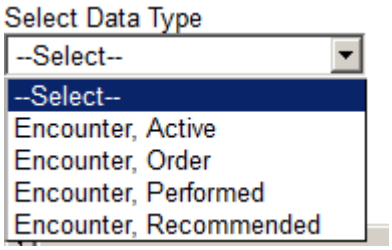
Example – In building the following Denominator system clause for NQF 0300, the user must apply the Inpatient Encounter QDM Element to the measure.

- ***Denominator =***
  - *AND: Occurrence A of Cardiac Surgery (principal ordinality) >= 1 minute(s) starts after start of Occurrence A of Inpatient Encounter*



2. The data types (contexts of use) associated with each QDM category are available in the **Select Data Type** drop-down menu. Select the desired data type.

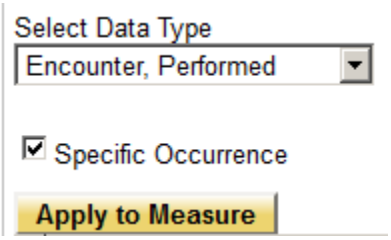
Example - For the QDM Inpatient Encounter, a possible data type is an Active Encounter, an Ordered Encounter, a Performed Encounter, or a Recommended Encounter.



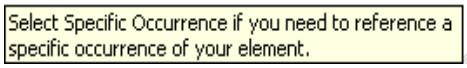
3. A user may want to specify a **Specific Occurrence** of a data element. The MAT allows the measure developer to indicate a single occurrence that is repeated through the measure logic.

Example: A measure defines a surgical procedure as the focus of measurement. That surgical procedure is expected to occur during an inpatient hospital encounter. Since an individual patient might have more than one procedure of the same type during the measurement year, it is important to indicate to which of them the measure elements refer. In this case, Occurrence A of the surgical procedure is listed as happening during Occurrence A of an inpatient hospital encounter. Further reference to Occurrence A of the procedure will assure the same procedure is referenced. Also, the measure can specify that repeat procedures of the same type are not included. For example, AND NOT: Occurrence B of the surgical procedure <= 3months starts before the start of Occurrence A of the surgical procedure. Occurrence helps to differentiate between two different events of the same type.

4. Select the **Specific Occurrence** checkbox to reference a specific instance of the data type selected.



a. A **Specific Occurrence** allows users to represent one to many instances of that data type for use in the selected measure. If a **Specific Occurrence** is selected, the phrase tool tip appears before the data type name in the available phrase elements for the measure.



i. To create additional occurrences for the same value set and data type combination, select the value set and data type and check the Specific Occurrence checkbox again. For subsequently created occurrences of the same data type, the next available letter (e.g., B) is assigned to represent that occurrence. Note that the Specific Occurrence feature can be applied to data types and not attributes of data types.

Example. In this example, when selecting the data type Encounter, Performed and then selecting Specific Occurrence, users can indicate a specific instance or date (Occurrence A) of the encounter data type to be used when implementing the measure into an EHR or other clinical systems. If that same data element is used again in the measure and references another specific instance of that same element, Occurrence B of that QDM element should be used. For instance, in this example, the phrase would be occurrence B of Encounter.

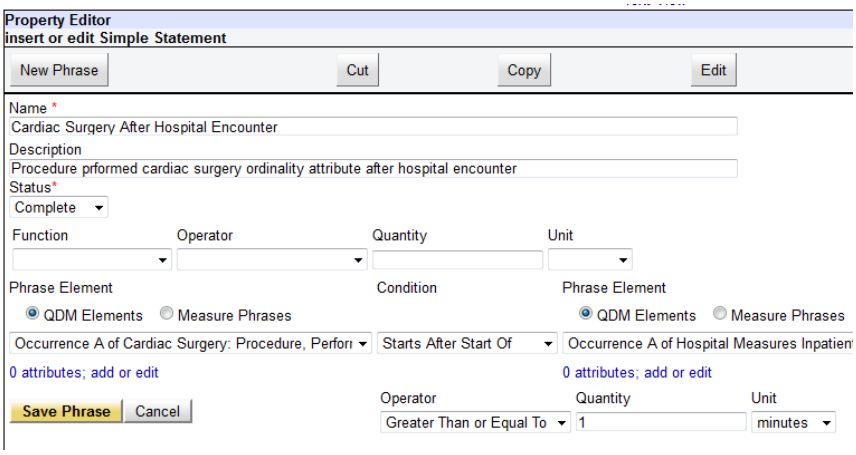
b. If the **Specific Occurrence** option is not selected when creating a data element, the words Occurrence A will not display. As a result, any reference to that QDM data element will indicate that any reference to it in the clinical record in the defined time frame is acceptable to meet the criteria of the measure.

- **Note:** Value sets with a category of Attribute (ATT) and the three measurement timing elements do not allow the selection of a specific occurrence.

5. Click **Apply to Measure**.

6. The user will then be able to select the **QDM element** in the **Phrase Element** field drop-down menu within the **Property Editor** when creating a measure

phrase. Users are able to access the **Phrase Element** field by selecting the **Measure Phrases** sub-tab and further selecting **New Phrase**.



Navigation Tip: Users can now move forward to build their measure phrase or apply an Attribute Value Set to their measure.

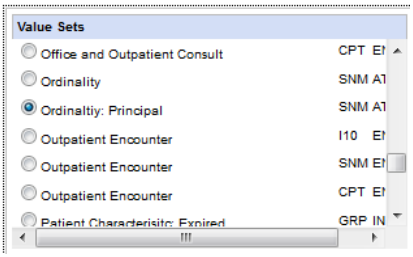
B. Apply Attribute Value Set to the Measure

This section lists the steps a user must take to select an **Attribute Value Set** to be available for use in their measure.

1. Click the radio box next to the **Value Set** that will be used to further define an **Attribute** in the measure logic. Applying an **Attribute** value set to a measure makes it available for use in the **Property Editor**.

Example - For OFMQ's measure NQF 0300, one of the populations in the denominator is: cardiac surgery performed before start of the specific occurrence of the inpatient hospital encounter. OFMQ applies the ordinality attribute to the QDM element: Procedure, Performed: Cardiac Surgery. To apply an attribute to the value set, the user must select the Principal value set in the value set box.

- ***Denominator =***
  - *AND: Occurrence A of Cardiac Surgery (principal ordinality) >= 1 minute(s) starts after start of Occurrence A of Inpatient Encounter*



2. Click **Apply to Measure**. The attribute value set is available to select when applying an attribute to a QDM element. Attributes do not have a data type, therefore users can not apply a data type when applying attributes to their measure.

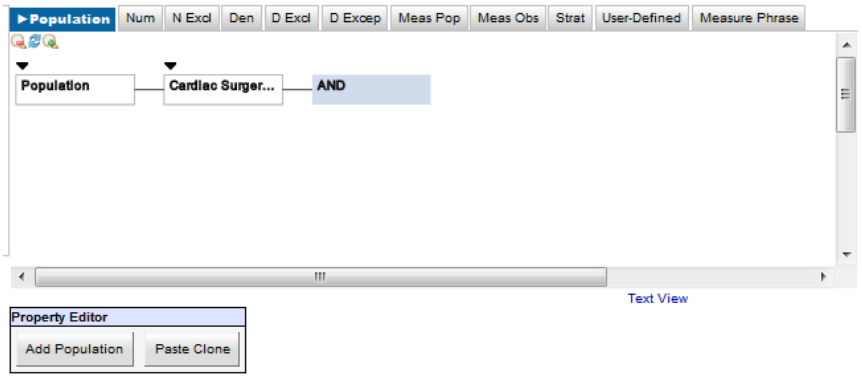
After applying the attribute value set to the measures, users need to add the attribute to the QDM element. Step-by-step instructions on how to add the attribute to the QDM element are listed on page 131in the Build Measure Phrases section in Chapter 9: Measure Composer—Clause Workspace.

Example - For the Cardiac Surgery Patients With Controlled 6 A.M. Post Operative Blood Glucose (NQF 0300) measure (see Appendix C for the measure's details), the following are QDM elements and attributes from the value sets that were created previously:

- Diagnosis, Active: Hospital Measures – Any infection
- Diagnosis, Active: Hospital Measures - Burn diagnosis
- Diagnosis, Active: Hospital Measures-Infection diagnosis
- Diagnosis, Active: Hospital Measures-Transplant
- Encounter: Hospital Measures-Encounter Inpatient
- Laboratory Test, Result: Hospital Measures-Glucose
- Patient Characteristic: birth date
- Patient Characteristic: Clinical trial participant
- Patient Characteristic: Expired
- Procedure, Performed: Cardiac Surgery
- Procedure, Performed: Hospital Measures-Joint Commission Evidence of a surgical procedure requiring general or neuraxial anesthesia
- Diagnosis, Active: Hospital Measures-Transplant
- Attribute: Principal

III. SYSTEM CLAUSE SUB-TABS

System Clause sub-tabs include **Population**, **Numerator**, **Numerator Exclusion**, **Denominator**, **Denominator Exclusion**, **Denominator Exception**, **Measure Population**, **Measure Observation**, **Stratification**, **User-Defined**, and **Measure Phrase** sub-tabs. The system clause sub-tabs appear in abbreviated form. Please note the last two sub-tabs: **User-Defined**, and **Measure Phrase** are not System Clauses. Detailed information on the purpose and intent of each of these tabs is provided in this section.



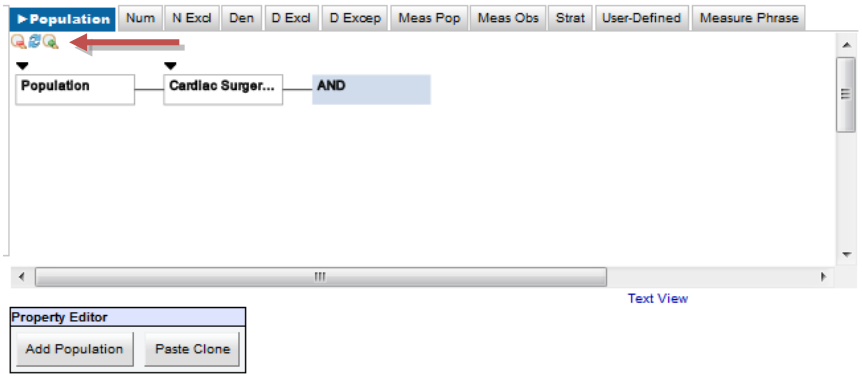
Clicking on the sub-tabs in the header bar (e.g., Population) opens the canvas for that System Clause, where the user can diagram the system clause. Another view of the "Clause Workspace" is the Text View. This will contain a 508 compliant tree diagram view of the system clause once it is built. To view the clause in text view, select the **Text View** link below the system clause box.

The following section provides a description of each of the system clause sub-tabs. Remember, various system clauses must be defined depending on the type of measure scoring selected.

- For **Proportion Measures**, the components are initial patient population, denominator, denominator exclusions, numerator, denominator exceptions, stratification and supplemental data elements.
- For **Continuous Variable Measures**, the components are initial patient population, measure population, measure observations, stratification and supplemental data elements.
- For **Ratio Measures,** the components include initial patient population, denominator, denominator exclusions, numerator, numerator exclusions, stratification and supplemental data elements.

A measure can contain multiple populations, numerators, and denominators. However, proportion measures must contain at least one **Population**, **Numerator**, and **Denominator** clause. A measure can contain Multiple **Numerator Exclusions**, **Denominator Exclusions**, and **Denominator Exceptions** clauses; however, they are not required. For a chart of required and optional system clauses by measure scoring (type), click here.

The "Clause Workspace" allows users to change the size of the canvas area. These functions are located in the upper left corner of the canvas area. Resizing options include the ability to decrease the diagram size, increase it, and reset it to the default size.



System clauses consist of QDM elements and smaller measure phrases that are joined together by **Operators** (And, Or), **Relativities** (During, Starts Before Start of, etc.), and **Comparators** (Less Than, Greater Than or Equal To, etc.). Appendix F lists out detailed information on functions, operators, and relative timings.

A. Population

The **Population** sub-tab is displayed in the final eMeasure as *Initial Patient Population* and designates the individuals for whom measurement is intended. The *Initial Patient Population* refers to all patients to be evaluated by a specific performance eMeasure. These patients share a common set of specified characteristics within a specific measurement set to which a given measure belongs.

This *Initial Patient Population* is present regardless of the measure scoring type; e.g., proportion, ratio and continuous variable measures all have an initial patient population section. Details often include information based upon specific age groups, diagnoses, diagnostic and procedure codes, and/or enrollment periods.

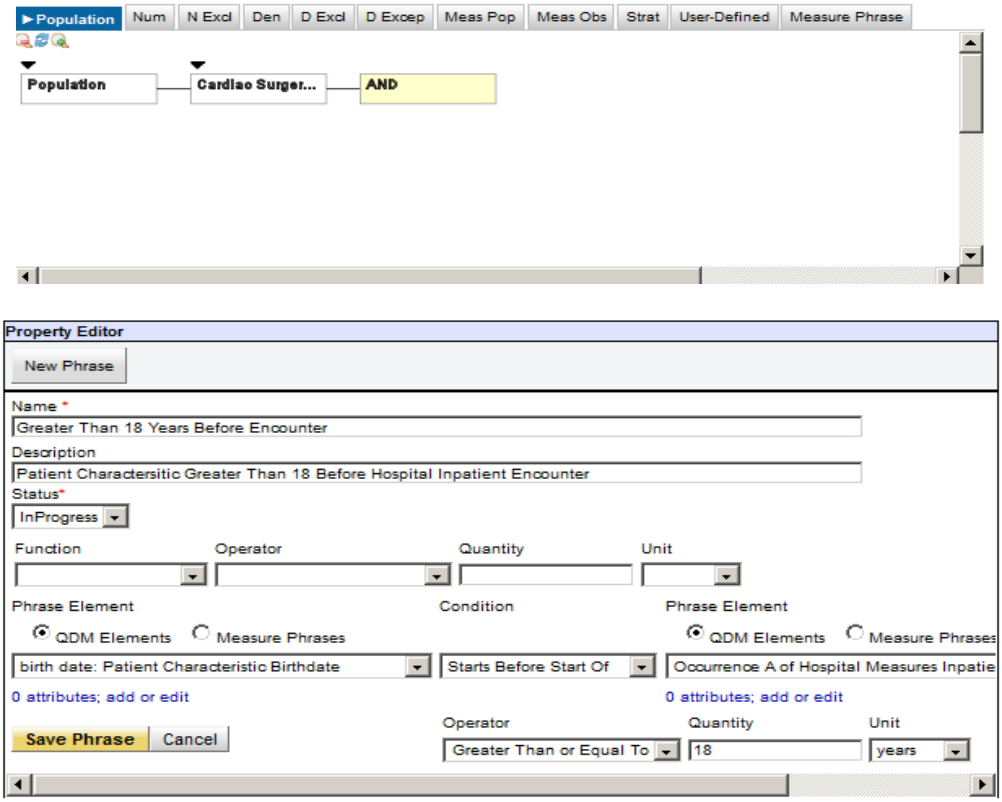
Example – This example describes the intent and purpose of NQF 0300. The intent of this measure is to measure patients that have a glucose level of less than or equal to 200 mg/dL, one and two days after cardiac surgery requiring general or neuraxial anesthesia.

The measure developer, Oklahoma Foundation for Medical Quality (OFMQ) describes the initial patient population as:

- *everyone who was*
  - *at least 18 years old before the inpatient encounter,*
  - *discharged from the inpatient cardiac surgery procedure during the measurement period, and*
  - *admitted for the inpatient cardiac surgery procedure for at most 120 days.*

*To convey this in the MAT, select the **And** box in the Population system clause canvas. Next, select the **New Phrase** button in the **Property Editor**.*

Select the phrase elements in the Phrase Element dropdown. Apply a comparator if the phrase includes two QDM Elements or Measure Phrases.



To add additional phrases to the Population sub-tab, Select the top-level AND and repeat the steps listed above.

B. Numerator

The **Numerator** sub-tab designates the interventions and/or outcomes expected for the individuals or events identified in the denominator and population. **Numerators** are **used in proportion and ratio measures**. 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 expected number of infections based on central line usage in a specific time period).

C. Numerator Exclusions

Numerator exclusions are those patients who are included in the initial patient population, who do not meet the measure numerator criteria, but do meet the specified numerator exclusionary criteria. **Numerator exclusions** are not

considered to be part of a given measure's numerator. **Numerator Exclusions** are **used only in ratio eMeasures** to define instances that should not be included in the numerator data.

D. Denominator

The **Denominator** sub-tab designates the individuals or events for which the expected process and/or outcome should occur. The denominator *can* be the same as the initial patient population or a subset of the initial patient population. A subset of the initial patient population is intended 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. For proportion or ratio measures, the verbiage "Equals Initial Patient Population" with no additional criteria indicates the denominator is identical to the initial patient population.

If the denominator for a measure is simply "All patients in the initial population" without any other requirements, the Denominator sub-tab can be left blank. At the time of export, the denominator will be handled and will reference the initial population in the eMeasure file.

Example – This example describes the intent and purpose of NQF 0300. The intent of this measure is to measure patients that have a glucose level of less than or equal to 200 mg/dL, one and two days after cardiac surgery requiring general or neuraxial anesthesia.

Of the initial patient population, the denominator will include:

- *everyone who was*
  - *in the initial patient population, and*
  - *had an inpatient cardiac surgery procedure start time that began after the inpatient encounter, and*
  - *excludes anyone with an infection that started before the inpatient cardiac surgery procedure, and*
  - *excludes anyone with a burn diagnosis during the inpatient cardiac surgery procedure, and*
  - *excludes anyone who had a transplant before the inpatient cardiac surgery procedure.*

E. Denominator Exclusions

The Denominator **Exclusions** sub-tab designates patients who are included in the population and meet initial denominator criteria, but who should be excluded from the measure calculation. Populations that are excluded from the denominator are patients who should be removed from the eMeasure population and denominator before determining if the numerator criteria are met. Denominator exclusions are used in proportion and ratio measures to help narrow the denominator.

F. Denominator Exceptions

The Denominator **Exceptions** sub-tab designates those individuals who may be removed from the denominator group if numerator criteria are not met. Note that denominator exceptions are applied only for patients who do not meet numerator criteria (e.g., the intervention was not performed). Patients meeting criteria for denominator exceptions who have also met numerator criteria *are not* removed from the denominator. 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.

Denominator exceptions allow for the exercise of clinical judgment and should be specifically defined. Generic denominator exception reasons used in proportion eMeasures fall into three general categories: Medical reasons, Patient reasons, and System reasons

G. Measure Population

The **Measure Population** sub-tab is **used for continuous variable measures only**. Continuous variable measures do not have a denominator, but instead define a measure population. The measure population is a subset of the initial patient population.

Example - To measure the wait time for patients to be seen in the Emergency Department (ED) for all patients of any age, the system clauses would be described as:

- ***Initial Patient Population*** includes all patients of any age.
- ***Measure Population*** includes all patients in the initial patient population who have had an ED encounter during the measurement period.
- ***Measure Observation*** (see below for definition) is the time from ED encounter arrival time to the time first seen by a clinician.

H. Measure Observation

The **Measure Observation** sub-tab is used for **continuous variable measures only**. They provide the description of how to evaluate performance (e.g., the time from Emergency Department arrival to departure). Measure observations are generally described using a statistical methodology such as: count, etc. Measure observations are not criteria but are definitions of observations used to score a measure. Within continuous variable measures, the measure

observation section is used to convey the calculation logic needed to report a particular outcome.

I. Stratification

The **Stratification** sub-tab is used to define the logic for the strata for which the measure is to be evaluated.

Each Stratum that a user adds to the **Stratification** tab of the "Clause Workspace" will automatically be included in a Reporting Stratification section of the eMeasure output.

Example. If the user adds four strata to the Stratification tab, these will appear in the Stratification section as 'Reporting Stratum 1', 'Reporting Stratum 2', 'Reporting Stratum 3', and 'Reporting Stratum 4'.

If the user builds five strata on the Stratification tab, and deletes the logic from Stratification 3 in the workspace (thereby 'emptying' Stratification 3), the workspace will continue to display Stratification 1, Stratification 2, Stratification 3 (which will be empty), Stratification 4, and Stratification 5 attached to the root in the canvas.

However, at the time of export, the empty Stratification 3 will be suppressed and the output will display Reporting Stratum 1, Reporting Stratum 2, Reporting Stratum 3 and Reporting Stratum 4 (what is entered as Stratification 4 and Stratification 5 on the workspace will display as Reporting Stratum 3 and Reporting Stratum 4 in the output).

If the user does not build any strata, or they have built one or more strata but then delete all of the logic off of the root, the output in the eMeasure will display 'None.'

J. User-Defined

The **User-Defined** sub-tab provides an area where users can copy clauses and rename them to give them more descriptive titles. Any clause in the **User-Defined** sub-tab can be used across all measures to which the user has access. This sub-tab can be used as a workspace for users to build clauses.

The **User–Defined** sub-tab provides an area where a user can paste and edit portions of other clauses to save as a user-defined clause. **User-defined** clauses display in the "Clause Library" sub tab in the lower left corner of the screen and can be cloned to be reused in other measures. If a user wants to name a system clause something other than the system-provided name, the user can copy and paste the clause into the **User-Defined** sub-tab and the user will be prompted to give the clause a new name.

To create a **User-Defined** clause:

1. In the desired System Clause sub-tab, click the rectangle representing the spot from which to copy.

2. Click **Copy** in the **Property Editor** box.

3. Click the **User-Defined** sub-tab to display the canvas.

4. Click the rectangle containing the measure name so that it is highlighted.

5. Click **Paste**. The copied measure information is pasted onto the rectangle.

6. If changes are needed, click the desired spot and **Edit** in the Property Editor box.

7. The clause will be saved and available for cloning in the **Clause Library** sub-tab in the lower left corner of the screen.

Shortcut keys for cut, copy, and paste are:

- Cut : ctrl-alt-x
- Copy: ctrl-alt-c
- Paste: ctrl-alt-v

K. Measure Phrase

The Measure Phrase sub-tab provides an area for users to build new measure phrases.

IV. CLAUSE LIBRARY/MEASURE PHRASES BOX

A. Clause Library

The **Clause Library** sub-tab on the bottom left-hand side of the screen contains all of the population, numerator, numerator exclusion, denominator, denominator exclusion, denominator exception, measure population, measure observation, and stratification clauses for measures the user created, as well as those that others have shared with the user. It also contains all of the user-defined clauses that the user has created and saved.

The Clause Library will display all clauses created by a user across measures in alphabetical order by name. Users can reuse any of the clauses created for this example measure in any measure by using the cloning function. For example, a single population clause can be built once for an asthma measure and then cloned and applied to other applicable asthma measures that have the same population requirements.

B. Measure Phrases

The **Measure Phrases** sub-tab on the bottom left-hand side of the screen contains all of the phrases that have been built for the measure. Phrases are short sections of logic that a user builds that can be reused within a measure. The list displays the measure phrase name entered for each phrase.

To view or edit a phrase:

1. Click the phrase in the **Measure Phrases** sub-tab.

2. A description of the measure phrase logic displays directly below the Measure Phrase sub-tab in the canvas at the top of the screen. In addition, the **Property Editor** at the bottom of the screen displays the input area for the phrase. The user can edit the phrase in the **Property Editor** box if desired.

To build a measure phrase:

1. Click the **Measure Phrase** sub-tab, and click **New Phrase**.

2. The **Property Editor** fields display. Enter a name for the phrase. As users may be building several phrases for their measure, it is important to provide a meaningful name for the phrase to refer to it easily later when building other phrases and clauses. Users can update a measure phrase name later, if necessary.

3. Enter a description for the phrase, if desired, to explain the purpose of the phrase.

4. The **Status** field defaults to In Progress. Users may change this to Complete if desired. Leave the **Status** set to In Progress if the phase is being edited or will change or finish at a later time. This helps to identify anything that has not been completed. At this time the Status field does not drive any other action or status in the MAT. This field is present solely to assist users in building phrases.

5. Users are prevented from saving a phrase that has only a name. Users must enter the remainder of the fields as appropriate, depending on the contents of the phrase the user is building. These will be discussed in the examples; however, the following is a brief description of the fields:

    a. **Function** field. See Appendix F for a description of each function. When some functions are selected, it may also be appropriate to complete the Operator and Quantity fields (e.g., Function: COUNT, Operator: Greater Than or Equal To, Quantity: 2).

- ***Note:***

COUNTDISTINCT: If users use the COUNTDISTINCT function, they must assign an attribute to the QDM element that counts in order for the EHR that implements the measure to understand what specifically is being counted. For example, if the measure wants to know if a patient had more than four distinct encounters during the measurement period, the user could assign the "start datetime" attribute to the encounter element, to count the distinct number of encounter start datetimes.

b. **Phrase Element** field. This drop-down list is filtered by both QDM elements and attributes or the Measure Phrases created, depending on which radio button is selected. A user is able to filter the Phrase Element drop down in the **Property Editor** by using the radio boxes.

   As phrases are added, the phrase names also display in the drop-down list when the Measure Phrase radio button is selected. The smallest of phrases could consist of only one QDM element. It is also possible to insert, or "nest," a phrase within another phrase. See further description of nesting below.

   i. Select the Use **Comparison** button to add a timing comparison to a QDM element. If the user clicks Use Comparison, the Condition and second Phrase Element fields are replaced by Operator, Quantity, and Unit fields (e.g., Encounter + 165 days would be built as Phrase Element: "Encounter", Operator: "Added To", Quantity: "165", Unit: "Days").

c. **Condition** field. This drop-down list contains the **AND** and **OR** Logical Operators, separated from Time Relationships (e.g., Starts Before or During), separated from Relationships (e.g., Causes, Has Goal Of). Users need to select the appropriate option based on the phrase they are building. To avoid making Relative Operator mistakes, the user is prevented from selecting comparative operators in the **Condition** drop-down menu.

d. **Phrase Element** field. This drop-down list is filtered by both QDM elements and attributes or the Measure Phrases created, depending on which radio button is selected. A user is able to filter the Phrase Element drop down in the **Property Editor** by using the radio buttons. If selecting an option from the second **Phrase Element** field, the phrase also must contain a selection from the first **Phrase Element** field, as well as a condition.

e. To add an attribute to a QDM element, click the "**0 attributes; add or edit**" option below the Phrase Element field. This option is available for

either Phrase Element field containing a QDM element. An Add/Edit Attributes box appears.

i. The options in the **Add/Edit Attributes** drop-down menu are filtered to show only those data type-specific attributes that apply to the category and data type of the element selected. The top of the list displays the data type-specific attribute options, while the bottom of the list displays the dataflow attribute options (e.g., source, recorder). Select the appropriate option from the drop-down list.

ii. Select **Add Attribute**. A second drop-down list displays.

iii. Three options are provided. Select **Check if Present** if the user only needs to verify if the attribute (e.g., route) is present. Select **Comparison** if the user needs to compare the attribute value to a certain threshold (e.g., equal to 150 mg). Select **Value Set** to check for the presence of a code to indicate the attribute (e.g., severity attribute with a value set to indicate mild).

iv. Select **Update Attribute**. The next options are dependent on the option chosen in the second drop-down list. If **Check if Present** was selected, then the user is returned to the box to add additional attributes if desired. If **Comparison** was selected, three additional fields display for the user to add the comparison values (e.g., length of stay attribute with "less than 120 days" comparator). If **Value Set** was selected, an additional field appears so that the user can select the desired value set for the attribute (severity attribute with Mild value set).

v. Select **Update Attribute**. The attribute displays in the **Add/Edit Attributes** box.

vi. Click **Save** to add the attribute to the element. The user is then returned to the **Property Editor** box. "1 attribute; add or edit" now displays below the **Phrase Element** field. A "Save Successful" message displays if saved successfully.

6. The user must click **Save** again to save the entire phrase. A "Save Successful" message appears if saved successfully.

7. Users can add additional system clauses, such as a second population, by clicking the appropriate button, e.g., Add Population, in the Property Editor box.

Navigation Tip: Once the user has completed building his or her value sets, attributes, measure phrases, and measure clauses the user should check the accuracy and completeness of the measure's details. Chapter 9: Measure Composer—Measure Details contains information about the Measure Details Tab. Once this is complete, the user can package the measure. Step-by-step instructions on how to package a measure can be found in Chapter 10: Measure Composer—Measure Packager.

C. Cloning of Clauses

Clauses can be cloned and used in the same or other measures as needed. When a clause is cloned, a new copy, or version, of the clause is made. Users will be able to modify the new cloned copy of the clause without affecting the original copy. Cloning can be very useful, particularly if users are authoring a set of measures that use the same population criteria, or if the user has a clause that is reused throughout one or more measures.

To clone a clause:

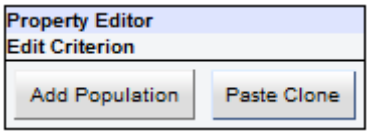
1. In the **Clause Library** sub-tab in the lower left corner, click the desired clause to clone. The clause name will appear highlighted.

2. Click **Clone**.

3. Open the desired System Clause sub-tab to paste the cloned phrase.

4. Click the rectangle containing the measure name (e.g., Asthma Drug Tx_Denominator1) so it is highlighted.

5. In the **Property Editor** box, select **Paste Clone**.



6. The cloned clause displays as a new System Clause in the sub-tab.

7. Changes may be made to the cloned clause if needed, or the cloned clause may be deleted.

Example

"The population for the Cardiac surgery measure example is: Patients aged 18 years and older before the day of admission for all inpatient hospitalizations with discharges during the measurement year, and whose hospital encounter is less than or equal to 120 days."

The population has three phrases:

- *Patients ages >=18 years before occurrence A of the inpatient hospital encounter admission*
- *Occurrence A of the inpatient hospital encounter discharge occurred during the measurement period*
- *Occurrence A of the inpatient hospital encounter <=120 days*

In eMeasure format, the population can be written as:

- `AND: "Patient Characteristic: birth date" >= 18 year(s) starts before start of "Occurrence A of Encounter, Performed: Hospital Measures - Encounter Inpatient"`
- `AND: "Occurrence A of Encounter, Performed: Hospital Measures - Encounter Inpatient (discharge datetime)" during "Measurement period"`
- `AND: "Occurrence A of Encounter, Performed: Hospital Measures - Encounter Inpatient (length of stay <= 120 day(s))"`

In the MAT, the user must

1. Select the **Population** sub-tab in the Clause Workspace.

2. To build the first component of the population (below), apply the default value set birthdate and the user created hospital measures inpatient encounter value set to the measure.

`AND: "Patient Characteristic: birth date" >= 18 year(s) starts before start of "Occurrence A of Encounter, Performed: Hospital Measures - Encounter Inpatient"`

Example- Select 'birth date' in the code lists box and select the patient characteristic data type in the drop down. Select Apply to Measure.

***The value set for birth date is pre-built in the MAT.*

a. *Select the value set associated with Hospital Measures – Encounter Inpatient. Please keep in mind that users can choose how to name value sets they have created. Select the Encounter, Performed data type in the data type drop down.*

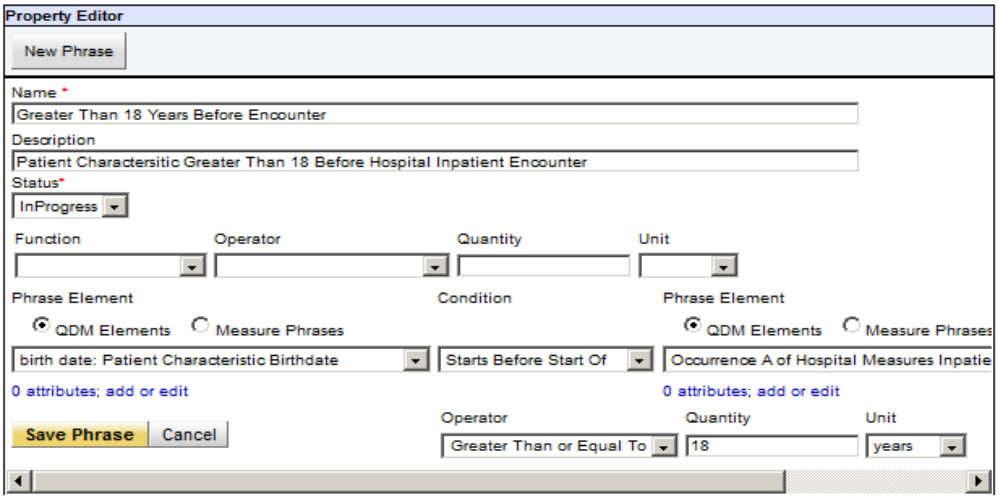
   i. *Because we want an occurrence of this encounter, select the specific occurrence radio button.*

ii. Select apply to measure.

3. *Select the Population System Clause tab. Click on the top-level AND and Click "New Phrase" in the Property Editor.*

4. *Enter the name of the phrase. By default the QDM Element radio button is selected. In the Phrase Element drop down select, birth date: Patient Characteristic Select the condition: Starts before the start of. For the second Phrase Element, select the QDM element radio button and select Occurrence A of Encounter, Performed: Hospital Measures-Encounter Inpatient..*

    a. *Because the age is limited to those 18 or older, select the "Add" button and input the information in the operator, quantity, and units fields that appear.*



Next, the user must build the remaining two phrases to complete building the population.

- *Occurrence A of Encounter: Hospital Inpatient <= 120 days*

Chapter 10: Measure Composer—Measure Packager

> **Chapter Overview:**
>
> *The Measure Packager allows users to combine or group system clauses into groupings, select Supplemental Data Elements, and provide a Value Set Package date. The groupings created may depend on the needs of the measure as well as the measure scoring (proportion, ratio, and continuous variable). For example, groupings may be used to express a measure with multiple populations but the use of a single numerator. Once the measure groupings have been created, a measure package can be created. Creating the measure package is the final step in creating the eMeasure.*

Once the user has the measure's system clauses and completed all of the fields on the Measure Details sub-tab, the user can create one or more measure groupings. Groupings are combinations of system clauses that can be 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, or continuous variable), the user must observe the rules when creating groupings. Please refer to Appendix G 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 will automatically include "AND: Initial Patient Population." Upon export of a ratio measure, both the numerator and the denominator in the human-readable version of the measure will automatically include "AND: Initial Patient Population."

Example

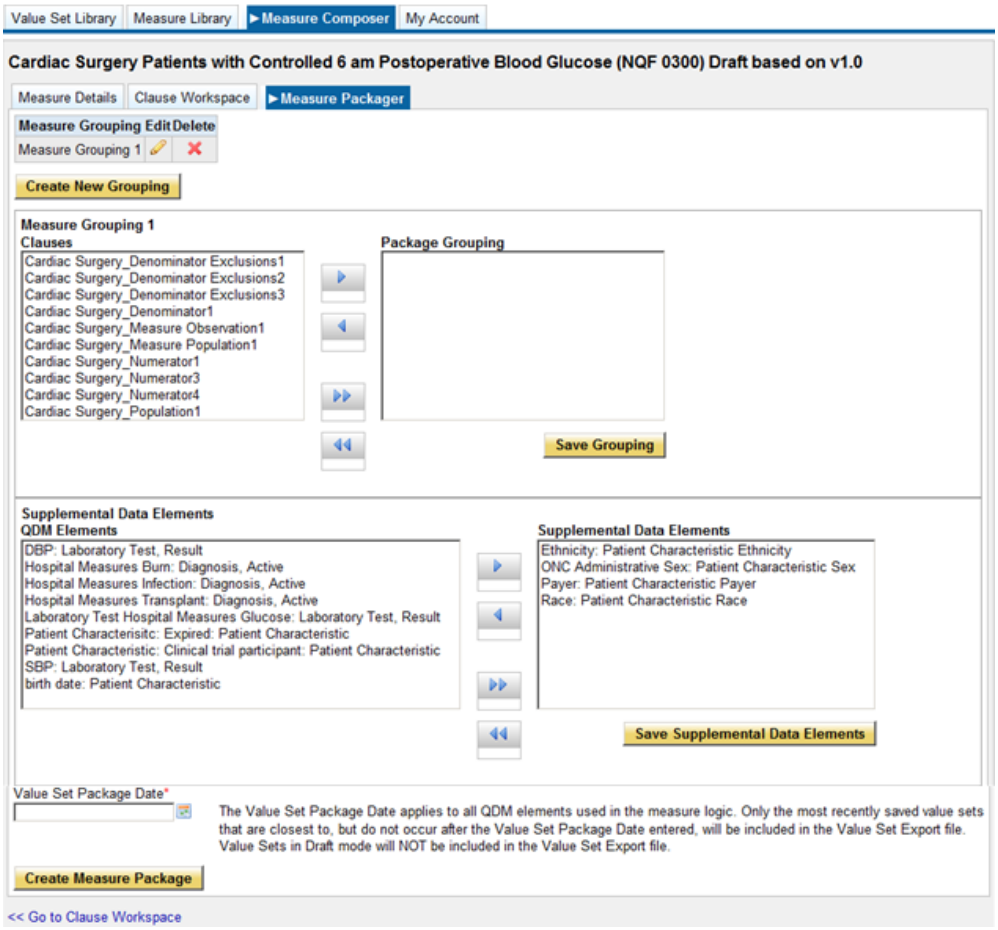
If the proportion measure is stratified by age and contains two populations (one for each age group), and one numerator and one denominator that apply to both populations, then the user would create two groupings as follows:

Grouping 1: Population 1, Denominator 1, Numerator 1

Grouping 2: Population 2, Denominator 1, Numerator 1

When the user packages a measure, all groupings for that measure will be included in the package. Only measures with packages can be exported.

When first accessing the Measure Packager sub-tab, users will see a Measure Grouping 1 area consisting of a Clauses box containing all of the system clauses the user created for the measure, as well as a Package Grouping box, which is empty.



I. CREATE A MEASURE GROUPING

1. Click the desired system clause in the Clauses box. The clause will be highlighted.

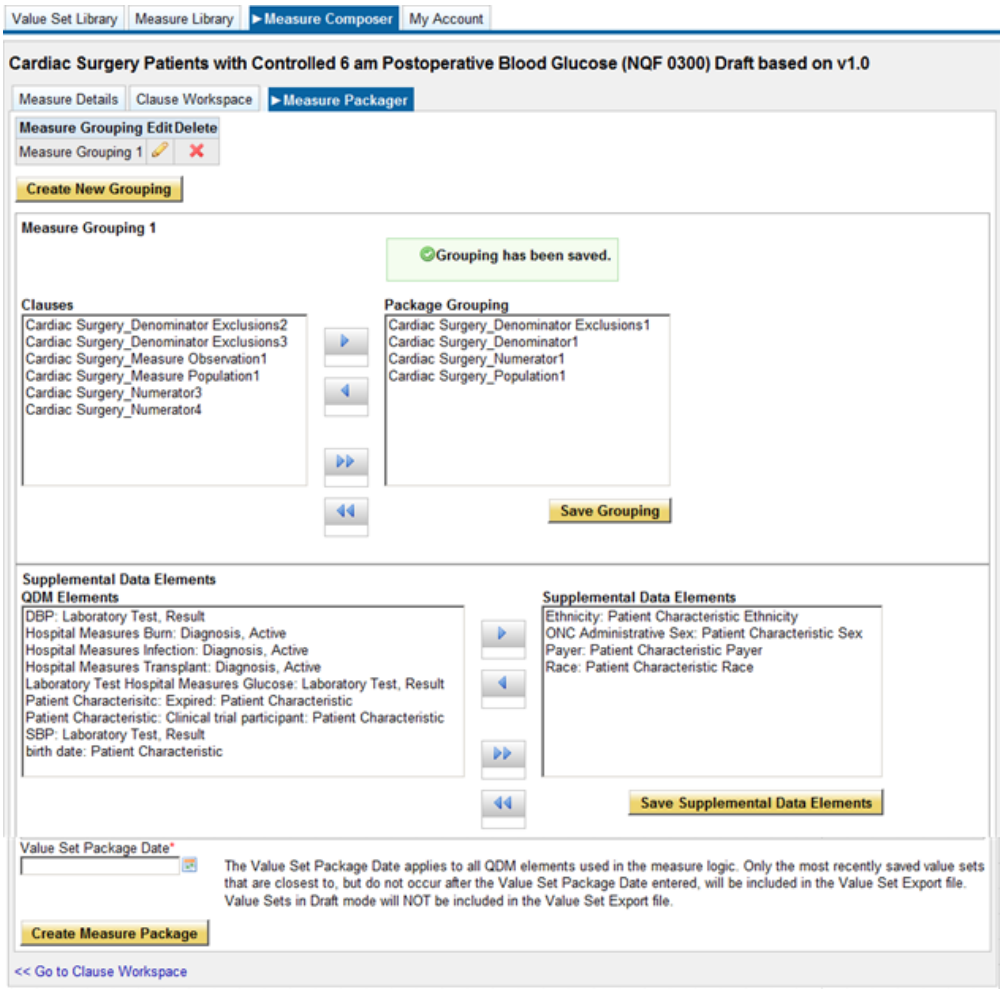
2. Click the right pointing arrow to move the clause from the Clauses box to the Package Grouping box.

3. Highlight another clause in the Clauses box and click the right pointing arrow to move it from the Clauses box to the Package Grouping box.

4. Continue moving clauses from the Clauses box to the Package Grouping box until all desired clauses have been transferred to the Package Grouping box.

5. Once the user has moved all desired clauses for the grouping from the Clauses box to the Package Grouping box, click Save Grouping.

6. Once a measure grouping has been saved, the application remains on the same page, and a message displays stating, “Grouping has been saved.” The Measure Grouping box displays at the top of the screen, containing an entry for Measure Grouping 1.



7. Users can move clauses back and forth between the Clauses box and the Package Grouping box using both the left and right pointing arrows.

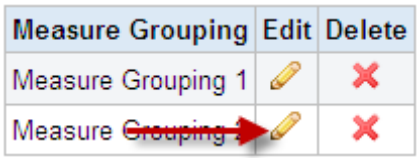
8. Clicking the double left and double right arrows moves all clauses at the same time between the Clauses box and the Package Grouping box.

9. To create an additional grouping, click Create New Grouping. Measure Grouping 2 displays above the Clauses box.

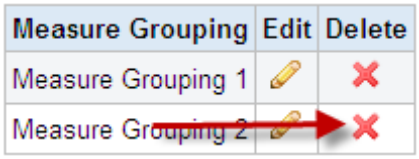
10. Repeat the steps outlined above to move clauses from the Clauses box to the Package Grouping box.

11. When all desired clauses have been moved to the Package Grouping box, click Save Grouping. A Save Successful message displays if saved successfully. Measure Grouping 2 displays in the Measure Grouping box at the top of the screen.

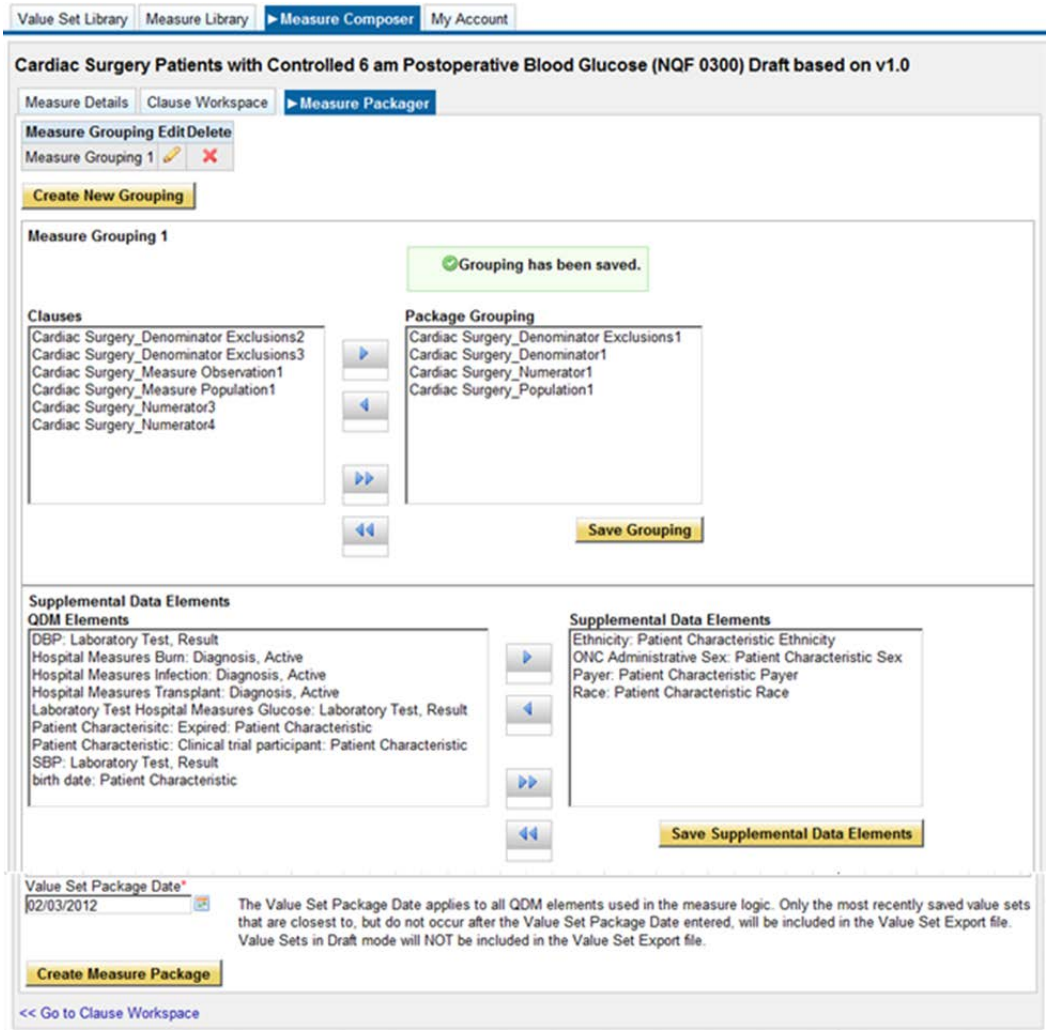
12. To view or edit a measure grouping, click the pencil icon next to the desired grouping. The clauses selected for that grouping display in the Package Grouping box.



13. To delete a measure grouping, click the red X icon next to the desired grouping. The grouping will be deleted from the Measure Grouping box.



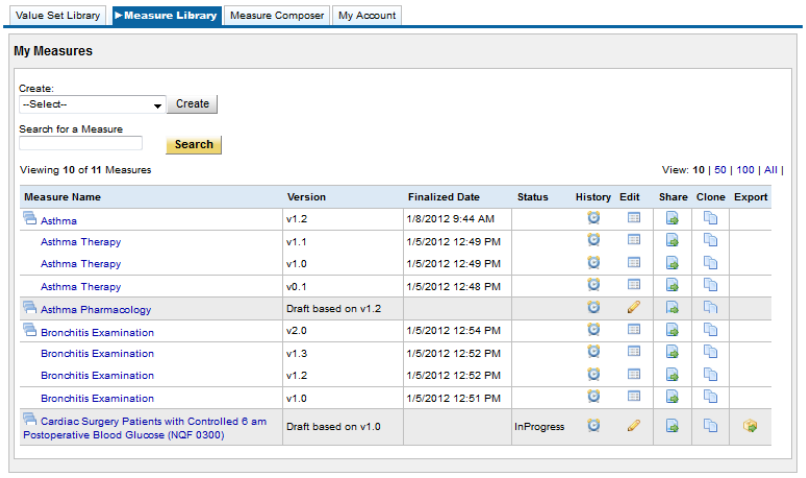
14. Once the user has created one or more Measure Groupings and are ready to package the measure, they must first enter a Value Set Package Date. A Value Set Package date is the date that is used to identify which iteration of the Value Sets to include in the measure. Iterations of Value Sets that are closest to but do not exceed the Value Set Package date are used to define the QDM Elements used within a measure's logic



15) Click Create Measure Package.

15. Once a Measure Package has been created, a user receives the following message:

- ***Note:*** *If changes are made to the measure once it's been 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. A Measure Package will only contain the Value Set for the QDM Element included in the measure logic that have a Last Modified date and time closest to but not exceeding the Value Set Package date.*



Navigation Tip: Upon completion of packaging a measure, the user must export the measure. Step-by-step instructions on how to export a measure can be found on page 87.

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.

CMS defines four supplemental data elements for each measure (payer, ethnicity, race and ONC Administrative Sex). They 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) Click the desired QDM Element in the QDM Element box. The QDM Element will be highlighted.

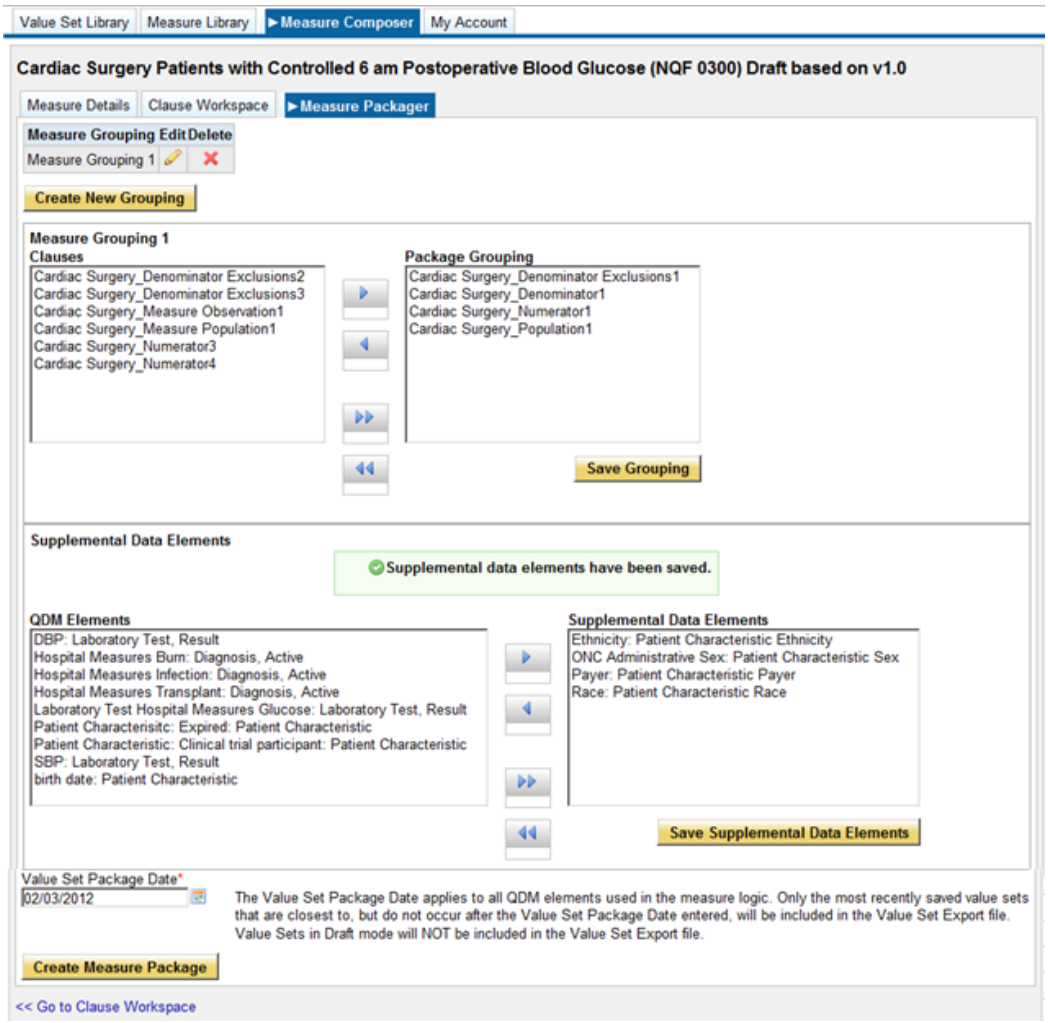
2) Click the right pointing arrow to move the QDM Element from the QDM Element box to the Supplemental Data Elements box.

3) 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.

4) 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.

5) Clicking 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.

If no Supplemental Data Elements are selected in the “Measure Packager” tab, the word ‘None’ will display 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 first enter a Value Set Package Date. A Value Set Package date is the date that is used to identify which iteration of the Value Sets to include in the measure. Iterations of Value Sets that are closest to but do not exceed the Value Set Package date are used to define the QDM Elements used within a measure's logic.

Click **Create Measure Package**, once the user has created Measure Grouping(s), selected Supplemental Data Elements and entered a Value Set Package date.

Glossary

Term	Definition
Attribute	A constraint on a QDM element that further defines the requirements for the measure logic. The available attributes are based on the category and data type of the QDM element. A complete list of attributes can be found in Appendix B.
Clinical Recommendation Statement	Summary of relevant clinical guidelines or other clinical recommendations supporting this eMeasure.
Clone	The ability to copy a clause and then 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.
Copyright	Identifies the organization(s) who own the intellectual property represented by the eMeasure.
Denominator	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 (see number 7 below for further definition). For proportion or ratio measures, the verbiage "Equals Initial Patient Population" with no additional criteria indicates the denominator is identical to the initial patient population. It 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 an eMeasure set may have different Denominators. Continuous Variable eMeasures do not have a Denominator, but instead define a Measure Population.
Denominator Exceptions	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.

Term	Definition
	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.
Denominator Exclusions	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.
Description	A general description of the eMeasure intent
Disclaimer	Disclaimer information for the eMeasure.
eMeasure Identifier	Represents the globally unique measure identifier for a particular quality eMeasure.
eMeasure Title	The title of the quality eMeasure.
eMeasure Version Number	A positive integer value used to indicate the version of the eMeasure.
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	A qualifier for a QDM element. Example: **FIRST** [Diagnosis] **COUNT** [ICU Encounter] FIRST and COUNT are the functions in these statements. A complete list of functions can be found in Appendix F.
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

Term	Definition
	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).
Initial Patient Population	The initial patient population refers to all patients to be evaluated by a specific performance eMeasure. These patients share a common set of specified characteristics within a specific measurement set to which a given measure belongs. This –initial patiet population is present regardless of the measure scoring type; i.e., proportion, ratio and continuous variable measures all have an initial patient population section.Details often include information based upon specific age groups, diagnoses, diagnostic and procedure codes, and enrollment periods. The *initial patient population* refers to all patients to be evaluated by a specific performance eMeasure who share 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.
Measure Developer	The organization that developed the eMeasure.
Measure Observations	Measure observations are **used only in continuous variable 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.

Term	Definition
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)
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).
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.
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

Term	Definition
	two).
Rationale	Succinct statement of the need for the measure. Usually includes statements pertaining to Importance criterion: impact, gap in care and evidence.
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 Measure Authoring Tool. 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 either in a Modify or View-Only mode. The user who has the measure shared with them will then have access to that measure in the designated access.
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	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. Additional supplemental data elements required for risk adjustment or other purposes of data aggregation can be included in the Supplemental Data Element section.
System Clause	The logic that defines the Population, Numerator, Numerator Exclusion, Denominator, Denominator Exclusion, Denominator Exception, Measure Population, or Measure Observation sections.
Transmission Format	URL or hyperlinks that link to the transmission formats that are specified for a particular reporting program.
Value Set OID	A unique identifier for each value set and grouped value set. Users can choose to enter a value set OID manually if one has already been defined outside of the Measure Authoring Tool. The user may instead choose to have the tool auto-generate a value set or grouped value set OID. The tool will use the root OID provided by the user upon account creation and append a unique identifier to this number to create the value set OID.
XML	Extensible Markup Language. XML provides a basic syntax that can be used to share information among different computers, applications, and organizations without needing to pass through many layers of conversion.

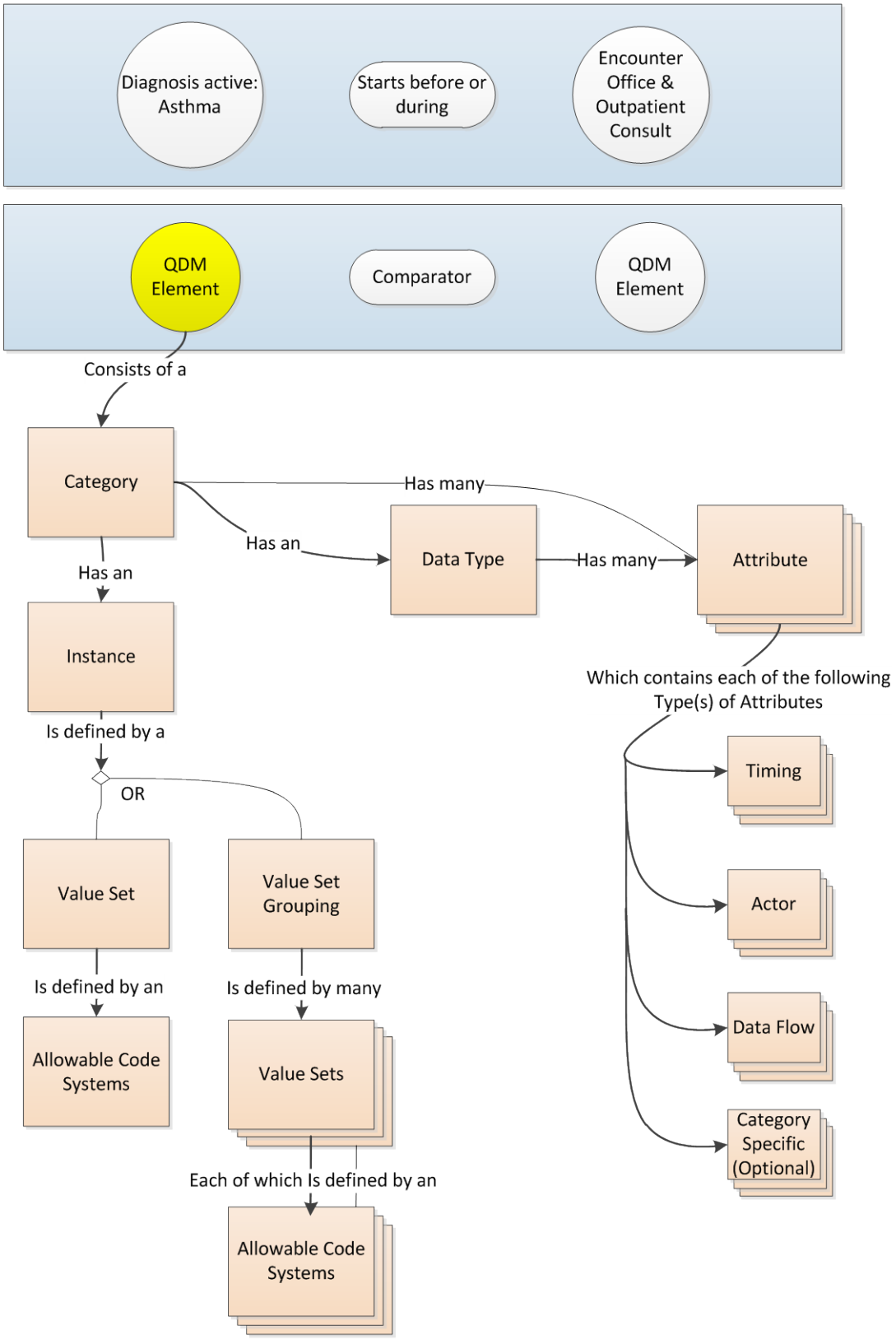
Appendices

APPENDIX A: QUALITY DATA MODEL (QDM) ELEMENT STRUCTURE

Each QDM element is composed of a *category*, a *data type*, 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 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 data type "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, recorder, or subject) attributes. Other attributes including *data flow* (sender, receiver) and category-specific attributes (e.g., medication attributes include route, and dose).[10] The following diagram illustrates the relationships among these QDM components.

[10] QDM Technical Specification, Version 3.0.
http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=60089.

Quality Data Model: QDM Element Structure

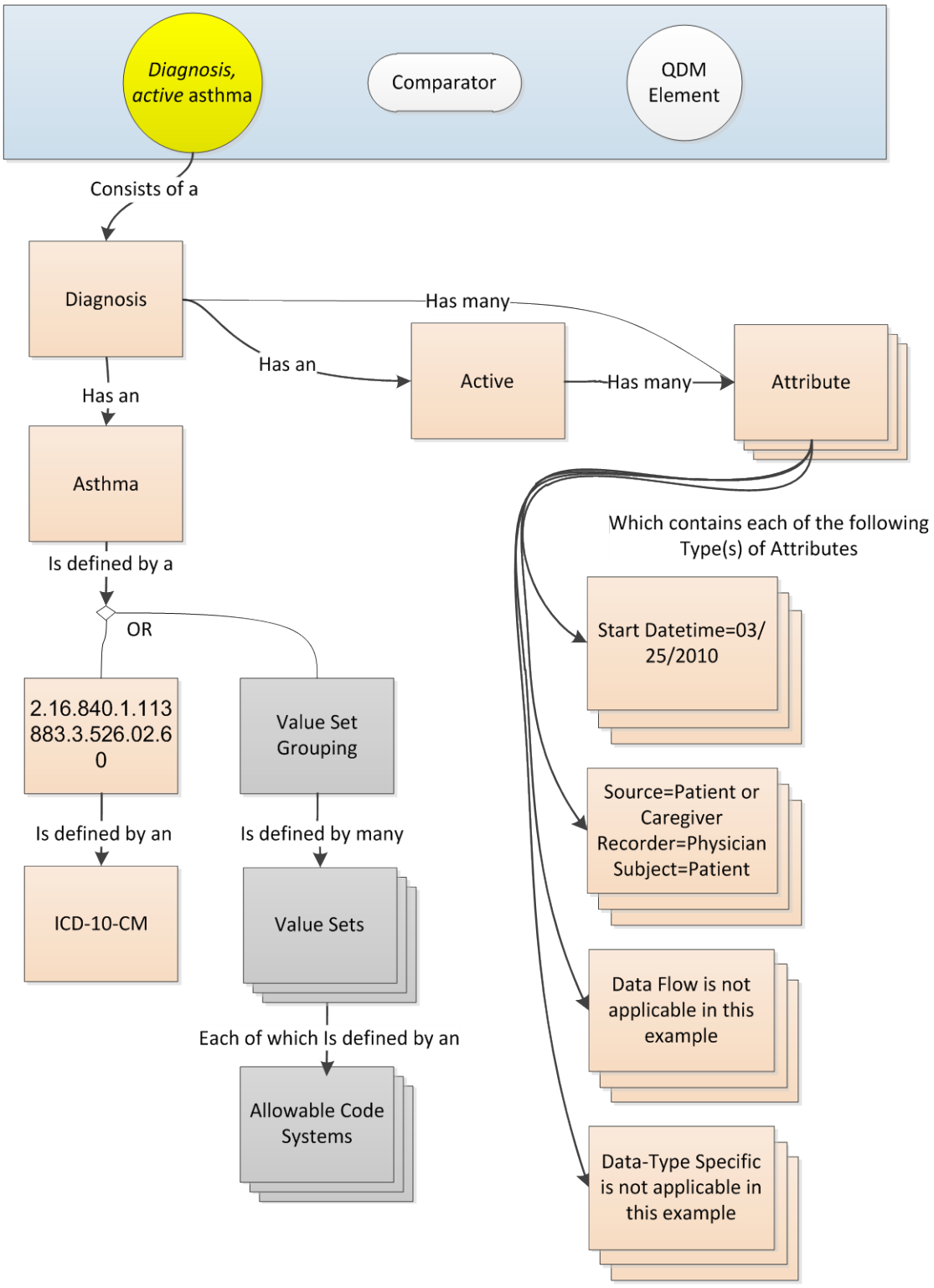


The image below uses each of these components to describe a QDM element indicating *"Diagnosis, active* asthma." The category is diagnosis and the data type is active. It includes a single set of codes using a single code system. In this example, the code system is ICD-10-CM. The attributes for asthma active can be defined as follows:

- Timing: start date/time (e.g., 03/25/2010)
- Actor: source (e.g., patient or caregiver), recorder (e.g., physician), and subject (e.g., patient)
- 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

Example of a Performance Measure Phrase



APPENDIX B: QUALITY DATA MODEL COMPONENT MATRIX

The Quality Data Model Component Matrix provides a list of allowable code systems. When first creating a value set, a category must be designated. The category selected will filter the allowable code systems to define the clinical concept. A data type must then be assigned to a value set to create a QDM element. The category selected will determine what data types are available. If the QDM element requires further definition through the use of an attribute, the attributes available for use are filtered by the category and data type combination selected to create the QDM element.

Table 1 lists the QDM category and code system. The code system recommended by the HITSC Clinical Quality Workgroup and Vocabulary Task Force are presented in the second column. The third column lists other code systems that can be used in the Measure Authoring Tool (MAT) that were not recommended by HITSC.

Table 2 lists the QDM category by data type and attribute.

Table 1. QDM Category and Code System

Category	Code Systems recommended from the HITSC Clinical Quality Workgroup and Vocabulary Task Force	Code Systems available in the Measure Authoring Tool but not recommended by HITSC
Care Experience	LOINC (for assessment instruments), SNOMED-CT (for appropriate responses)	No other allowable code systems
Care Goal		SNOMED-CT
Communication	SNOMED-CT	CPT, ICD-9, ICD-10, HCPCS, LOINC,
Condition/Diagnosis/ Problem	SNOMED-CT	ICD-9, ICD-10
Device	SNOMED-CT	GMDN, ICD-9, ICD-10, UMDNS
Diagnostic Study	LOINC (for specific study name), SNOMED-CT (for appropriate findings), UCUM (for specific units of measure)	CPT, HCPCS, HL7, ICD-9, ICD-10
Encounter	SNOMED-CT	CPT, HCPCS, HL7, ICD-9, ICD-10
Functional Status	ICF (for categories of function), LOINC (for assessment tools), SNOMED-CT (for appropriate responses)	
Individual Characteristic	ISO 639-2 (for patient's preferred language), LOINC (for assessment instruments), PHIN-VADS (for ONC Administrative Sex, race, and ethnicity), SNOMED-CT (for appropriate responses to instruments)	ASC X12, HL7, ICD-9, ICD-10
Intervention	LOINC (for interactions that produce an assessment or measureable results), SNOMED-CT (for appropriate results and interventions that do not produce measureable results)	CPT, CVX, HCPCS, ICD-9, ICD-10
Laboratory Test	LOINC (for specific study name), SNOMED-CT (for appropriate findings), UCUM (for specific units of measure)	CPT, HCPCS
Medication	CVX (for vaccination), RxNorm (for medication)	

Category	Code Systems recommended from the HITSC Clinical Quality Workgroup and Vocabulary Task Force	Code Systems available in the Measure Authoring Tool but not recommended by HITSC
Physical Exam	LOINC (for assessment instruments), SNOMED-CT (for appropriate responses)	ICD-9, ICD-10
Procedure	SNOMED-CT	CPT, CVX, HCPCS, ICD-9, ICD-10,
Risk Category/Assessment	LOINC (for evaluation instruments), SNOMED-CT (for appropriate responses)	No other allowable code systems
Substance	SNOMED-CT	
Symptom	SNOMED-CT	ICD-9, ICD-10
System Characteristic	HL7 (for EHR functions), LOINC (for staffing resources), SNOMED-CT (for equipment)	
Transfer of Care	SNOMED-CT	No other allowable code systems

Table 2. QDM Category by Data Type and Attribute

Category	Datatype	Attribute
Attribute	N/A	N/A
	Patient Care Experience	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
	Provider Care Experience	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
	Care Goal	negation rationale
		patient preference
		provider preference
		related to
		start datetime
		stop datetime
	Communication: From Patient to Provider	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
	Communication: From Provider to Patient	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
	Communication: From Provider to Provider	negation rationale
		patient preference

Category	Datatype	Attribute
		provider preference
		start datetime
		stop datetime
Condition/Diagnosis/Problem	Diagnosis, Active	negation rationale
		laterality
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		status
		stop datetime
	Diagnosis, Family History	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
	Diagnosis, Inactive	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
	Diagnosis, Resolved	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
Device	Device, Adverse Event	negation rationale
		patient preference
		provider preference

Category	Datatype	Attribute
		reaction
		start datetime
		stop datetime
	Device, Allergy	negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Device, Applied	negation rationale
		anatomical structure
		patient preference
		provider preference
		start datetime
		removal datetime
		reason
	Device, Intolerance	negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Device, Order	negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Device, Recommended	negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
Diagnostic Study	Diagnostic Study, Adverse Event	negation rationale
		patient preference
		provider preference
		radiation dosage
		radiation duration

Category	Datatype	Attribute
		reaction
		start datetime
		stop datetime
	Diagnostic Study, Intolerance	negation rationale
		patient preference
		provider preference
		radiation dosage
		radiation duration
		reaction
		start datetime
		stop datetime
	Diagnostic Study, Order	method
		negation rationale
		patient preference
		provider preference
		radiation dosage
		radiation duration
		reason
		start datetime
		stop datetime
	Diagnostic Study, Performed	facility location
		method
		negation rationale
		patient preference
		provider preference
		radiation dosage
		radiation duration
		reason
		start datetime
		stop datetime
	Diagnostic Study, Recommended	method
		negation rationale
		patient preference
		provider preference
		radiation dosage

Category	Datatype	Attribute
		radiation duration
		start datetime
		stop datetime
	Diagnostic Study, Result	method
		negation rationale
		patient preference
		provider preference
		radiation dosage
		radiation duration
		reason
		result
		status
		start datetime
		stop datetime
	Encounter, Active	length of stay
		facility location
		negation rationale
		patient preference
		provider preference
		reason
		admission datetime
		discharge datetime
		facility location arrival datetime
		facility location departure datetime
	Encounter, Order	facility location
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Encounter, Performed	discharge status
		length of stay
		facility location
		negation rationale
		patient preference
		provider preference
		reason
		admission datetime

Category	Datatype	Attribute
		discharge datetime
		facility location arrival datetime
		facility location departure datetime
	Encounter, Recommended	facility location
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
Functional Status	Functional Status, Order	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Functional Status, Performed	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Functional Status, Recommended	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Functional Status, Result	method
		negation rationale
		patient preference
		provider preference

Category	Datatype	Attribute
		reason
		result
		start datetime
		stop datetime
Individual Characteristic	Patient Characteristic	start datetime
		stop datetime
	Patient Characteristic Birth Date	start datetime
		stop datetime
	Patient Characteristic Expired	date
		time
		reason
	Patient Characteristic Clinical Trial Participant	start datetime
		stop datetime
		reason
	Patient Characteristic Payer	start datetime
		stop datetime
	Patient Characteristic Sex	start datetime
		stop datetime
		Reason
	Patient Characteristic Ethnicity	N/A
	Patient Characteristic Race	N/A
	Provider Characteristic	negation rationale
		start datetime
		stop datetime
Intervention	Intervention, Adverse Event	negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Intervention, Intolerance	negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Intervention, Order	method
		negation rationale

Category	Datatype	Attribute
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Intervention, Performed	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Intervention, Recommended	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Intervention, Result	method
		negation rationale
		patient preference
		provider preference
		reason
		result
		start datetime
		stop datetime
		status
Laboratory Test	Laboratory Test, Adverse Event	status
		negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Laboratory Test, Intolerance	negation rationale
		patient preference

Category	Datatype	Attribute
		provider preference
		reaction
		start datetime
		stop datetime
	Laboratory Test, Order	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Laboratory Test, Performed	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Laboratory Test, Recommended	method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Laboratory Test, Result	method
		negation rationale
		patient preference
		provider preference
		reason
		result
		status
		start datetime
		stop datetime
Medication	Medication, Active	cumulative medication duration
		dose

Category	Datatype	Attribute
		frequency
		negation rationale
		number
		patient preference
		provider preference
		refills
		route
		start datetime
		stop datetime
	Medication, Administered	dose
		reason
		frequency
		negation rationale
		number
		patient preference
		provider preference
		refills
		route
		start datetime
		stop datetime
		date
		time
	Medication, Adverse Effects	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills
		route
		start datetime
		stop datetime
	Medication, Allergy	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills
		route
		start datetime

Category	Datatype	Attribute
		stop datetime
	Medication, Discharge	dose
		frequency
		number
		refills
		route
		start datetime
		stop datetime
	Medication, Dispensed	cumulative medication duration
		dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		refills
		route
		start datetime
		stop datetime
	Medication, Intolerance	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills
		route
		start datetime
		stop datetime
	Medication, Order	cumulative medication duration
		dose
		frequency
		method
		negation rationale
		number
		patient preference
		provider preference
		reason
		refills
		route

Category	Datatype	Attribute
		start datetime
		stop datetime
Physical Exam	Physical Exam, Finding	anatomical structure
		method
		negation rationale
		patient preference
		provider preference
		reason
		result
		start datetime
		stop datetime
	Physical Exam, Order	anatomical structure
		method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Physical Exam, Performed	anatomical structure
		method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
	Physical Exam, Recommended	anatomical structure
		method
		negation rationale
		patient preference
		provider preference
		reason
		start datetime
		stop datetime
Procedure	Procedure, Adverse Event	negation rationale

Category	Datatype	Attribute
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Procedure, Intolerance	negation rationale
		patient preference
		provider preference
		reaction
		start datetime
		stop datetime
	Procedure, Order	ordinality
		method
		negation rationale
		patient preference
		provider preference
		reason
		start date/time
		stop date/time
	Procedure, Performed	ordinality
		method
		negation rationale
		patient preference
		provider preference
		result
		reason
		incision datetime
		start datetime
		stop datetime
	Procedure, Recommended	ordinality
		method
		negation rationale
		patient preference
		provider preference
		reason
		start date/time
		stop date/time
	Procedure, Result	ordinality
		method
		radiation dosage
		radiation duration
		negation rationale
		patient preference

Category	Datatype	Attribute
		provider preference
		reason
		Result
		status
		start datetime
		stop datetime
Risk Category / Assessment	Risk Category Assessment	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
		result
Substance	Substance, Administered	dose
		date
		time
		frequency
		negation rationale
		number
		patient preference
		provider preference
		refills
		route
		start datetime
		stop datetime
	Substance, Adverse Event	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills
		route
		start datetime
		stop datetime
	Substance, Allergy	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills

Category	Datatype	Attribute
		route
		start datetime
		stop datetime
	Substance, Intolerance	dose
		frequency
		negation rationale
		number
		patient preference
		provider preference
		reaction
		refills
		route
		start datetime
		stop datetime
	Substance, Order	dose
		frequency
		method
		negation rationale
		number
		patient preference
		provider preference
		reason
		refills
		route
		start datetime
		stop datetime
	Substance, Recommended	dose
		frequency
		method
		negation rationale
		number
		patient preference
		provider preference
		reason
		refills
		route
		start datetime
		stop datetime
Symptom	Symptom, Active	environment
		negation rationale
		ordinality
		patient preference
		provider preference

Category	Datatype	Attribute
		severity
		start datetime
		status
		stop datetime
	Symptom, Assessed	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
	Symptom, Inactive	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
	Symptom, Resolved	negation rationale
		ordinality
		patient preference
		provider preference
		severity
		start datetime
		status
		stop datetime
System Characteristic	System Characteristic	negation rationale
		start datetime
		stop datetime
Transfer of Care	Transfer From	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime
Transfer of Care	Transfer To	negation rationale
		patient preference
		provider preference
		start datetime
		stop datetime

APPENDIX C: CARDIAC SURGERY PATIENTS WITH CONTROLLED 6 A.M. POSTOPERATIVE BLOOD GLUCOSE (NQF 0300)

eMeasure Title	Cardiac Surgery Patients with Controlled 6 am Postoperative Blood Glucose (NQF 0300)		
eMeasure Identifier (Measure Authoring Tool)		**eMeasure Version number**	1
NQF Number	0300	**GUID**	da4ba74c-1db4-447c-8283-191dbdce93e8
Measurement Period	January 1, 20xx through December 31, 20xx		
Measure Steward	Oklahoma Foundation for Medical Quality		
Measure Developer	Oklahoma Foundation for Medical Quality		
Endorsed By	National Quality Forum		
Description	Cardiac surgery patients with controlled 6 A.M. blood glucose (less than or equal to 200 mg/dL) on postoperative day one (POD 1) and postoperative day two (POD 2) with Anesthesia End Date being postoperative day zero (POD 0).		
Copyright	None		
Disclaimer	None		
Measure Scoring	Proportion		
Measure Type	Process		
Stratification	None		
Risk Adjustment	None		
Rate Aggregation	None		
Rationale	Hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions. In a study by Zerr, et al (1997), the risk of infection was significantly higher for patients undergoing coronary artery bypass graft (CABG) if blood glucose levels were elevated. Furthermore, Zerr, et al (2001), demonstrated that the		

	incidence of deep wound infections in diabetic patients undergoing cardiac surgery was reduced by controlling mean blood glucose levels below 200mg/dL in the immediate postoperative period. Latham, et al (2001), found that hyperglycemia in the immediate postoperative phase increases the risk of infection in both diabetic and nondiabetic patients and the higher the level of hyperglycemia, the higher the potential for infection in both patient populations. A study conducted in Leuven, Belgium (Van den Berghe, 2001), demonstrated that intensive insulin therapy not only reduced overall in-hospital mortality but also decreased blood stream infections, acute renal failure, red cell transfusions, ventilator support, and intensive care. Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients.
Clinical Recommendation Statement	Controlling hyperglycemia can reduce adverse effects after surgery. Studies have shown that hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions.
Improvement Notation	Higher score indicates better quality.
Reference	Gordon SM, Serkey JM, Barr C, et al. The relationship between glycosylated hemoglobin (HgA1c) levels and postoperative infections in patients undergoing primary coronary artery bypass surgery (CABG.) Infect Control Hosp Epidemiol. 1997;18(No.5, Part 2):29(58.) PMID: 00000.
Reference	Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. Ann Thorac Surg. 1999:67:352-360. PMID: 10197653.
Reference	Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. J Thorac Cardiovasc Surg. 2000 Jan;119(1):108-114. PMID: 10612768.
Reference	Trick WE, Scheckler WE, Tokars JI, et al. Risk factors for radial artery harvest site infection following coronary artery bypass graft surgery. Clin Infect Dis. 2000 Feb;30(2):270-275.PMID: 10671327.
Reference	Menzin J, Langly-Hawthron C, Friedman M, et al. Potential short-term economic benefits of improved glycemic control: a managed care prospective. Diabetes Care. 2001 Jan;24(1):51-55. PMID: 11194241.
Reference	Dellinger E. Preventing Surgical-Site Infections: The importance of timing and glucose control. Infect Control Hosp Epidemiol. 2001;22(10):604-606. PMID: 11776344.
Reference	Latham R, Lancaster AD, Covington JF, etal. The association of diabetes and glucose control with surgical-site infections among cardiothoracic surgery Specifications Manual for National Hospital Inpatient Quality Measures Discharges 10-01-10 (4Q10) through 03-31-11 (1Q11) SCIP-Inf-4-3 patients. Infect Control Hosp Epidemiol. 2001 Oct;22(10):607-612. PMID: 11776345.
Reference	McAlister FA, Man J, Bistritz L, et al. Diabetes and coronary artery bypass surgery: an examination of perioperative glycemic control and outcomes. Diabetes Care. 2003 May;26(5):1518-1524. PMID: 12716815.
Reference	Estrada CA, Young JA, Nifong LW, et al. Outcomes and perioperative hyperglycemia in patients with or without diabetes mellitus undergoing coronary artery bypass grafting. Ann Thorac Surg. 2003 May;75(5):1392-1399. PMID: 12735552.
Reference	Terranova A. The effects of diabetes mellitus on wound healing. Plast Surg Nurs. 1991:11(1):20-25. PMID: 2034714.

Reference	Woodruff RE, Lewis SB, McLeskey CH, et al. Avoidance of surgical hyperglycemia in diabetic patients. JAMA. 1980 Jul 1;244(2):166-168. PMID: 6991732.
Reference	Dellinger EP, Gross PA, Barrett TL, et al: Quality standard for antimicrobial prophylaxis in surgical procedures. Infectious Diseases Society of America. Clin Infect Dis. 1994;18: 422-427. PMID: 8207176.
Reference	Zerr KJ, Furnary AP, Grunkemeier GL, et al. Glucose control lowers the risk of wound infection in diabetics after open heart operations. Ann Thorac Surg. 1997 Feb;63(2):356-361. PMID: 9033300.
Reference	Pomposelli JJ, Baxter JK 3rd, Babineau TJ, et al. Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. J Parenter Enteral Nutr. 1998 Mar-Apr;22(2):77-81. PMID: 9527963.
Reference	Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. N Engl J Med. 2001 Nov 8;345(19):1359-1367. PMID: 11794168.
Definition	None
Guidance	The measurement period is one calendar year but the reporting period is 3 months as a calendar quarter; Q1 = Jan – Mar, Q2 = Apr – Jun, Q3 = Jul – Sep, Q4 is Oct – Dec. Patients for whom there are missing or inaccurate data (e.g., arrival time, medication administration, etc.) are considered to have failed the measure; the total number of patients with missing or erroneous (e.g., a time of 03:69 or a date of 10/26/2035) data (i.e., measure failures) must be reported with the results of the measure. General guidance: The original measure excludes patients who have had a laparoscopic procedure unless the laparoscopic incision has been extended during the procedure. ICD-10 allows definition of such extension with procedure codes; ICD-9 does not. For those using ICD-9 any laparoscopic procedure that extends the incision should be included. In this measure the value sets that describe types of surgical procedures remain only in ICD-9 or ICD-10 because the concepts that apply are limited to a very specific subset of all surgical procedures. Exclusion element guidance: The exclusion for patients who are clinical trial participants is limited to patients participating in a clinical trial for the same conditions as covered by the measure. Other clinical trials are not valid reasons for exclusions. The measure as initially specified excludes all patients who die peri-operatively. The exclusion in this measure covers the same peri-operative scenario, the death time is the same as the discharge time. AND NOT [Encounter: encounter inpatient].discharge date starts after the end of [Procedure, Performed: Joint Commission Evidence a surgical procedure requiring general or neuraxial anesthesia].end date starts after the end of [Procedure, Performed: cardiac surgery].date < 2 days. By convention, discharge date post "encounter inpatient" is used to describe the hospital discharge date. Where logic needs to indicate discharge (or transfer) from one inpatient location to another, the logic uses "Transfer From" or "Transfer To" as the QDM data type.
Transmission	None

Format	
Initial Patient Population	All hospital discharges for cardiac surgery with hospital stays <= 120 days during the measurement year for patients age 18 and older at the time of hospital admission and no evidence of prior infection 18 years of age and older.
Denominator	Cardiac surgery patients with no evidence of prior infection 18 years of age and older with An ICD-9-CM Principal Procedure Code of selected surgeries AND An ICD-9-CM Principal Procedure Code of selected surgeries.
Denominator Exclusions	Patients who had a principal diagnosis suggestive of preoperative infectious diseases. Burn and transplant patients. Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope. Patients enrolled in clinical trials. Patients whose ICD-9-CM principal procedure occurred prior to the date of admission. Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented infection prior to surgical procedure of interest. Patients who expired perioperatively.
Numerator	Surgery patients with controlled 6 A.M. blood glucose (less than or equal to 200 mg/dL) on post-operative day (POD) 1 and postoperative day (POD) 2.
Numerator Exclusions	N/A
Denominator Exceptions	N/A
Measure Population	N/A
Measure Observations	N/A
Supplemental Data Elements	Report "Patient Characteristic: ONC Administrative Sex" using "ONC Administrative Sex Value Set (2.16.840.1.113762.1.4.1)"; Report "Patient Characteristic: Race" using "Race CDC Value Set (2.16.840.1.114222.4.11.836)"; Report "Patient Characteristic: Ethnicity" using "Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)"; Report "Patient Characteristic: Payer" using "Payer Source of Payment Typology Value Set (2.16.840.1.114222.4.11.3591)".

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Population criteria

- **Initial Patient Population =**
  - AND NOT: "Laboratory Test, Result: SBP" >= 140 hour(s) starts before or during "Measurement Period"
  - AND: "Occurrence A of Encounter, Performed: Hospital Measures Inpatient" during "Measurement Period"
  - AND: Count <= 120 day(s) of:"Occurrence A of Encounter, Performed: Hospital Measures Inpatient"

    - AND: IMMEDIATE PRIOR "Patient Characteristic: birth date"
    - AND: CURRENT "Patient Characteristic: birth date"
- **Denominator =**
    - AND: "Initial Patient Population"
    - AND NOT: "Diagnosis, Active: Hospital Measures Infection" during ("Occurrence A of Procedure, Performed: Cardiac Surgery (incision datetime)" during "Occurrence A of Encounter, Performed: Hospital Measures Inpatient (admission datetime)")
    - AND NOT: "Diagnosis, Active: Hospital Measures Infection (ordinality: 'Ordinaltiy: Principal')" during "Occurrence A of Encounter, Performed: Hospital Measures Inpatient"
    - AND NOT: "Diagnosis, Active: Hospital Measures Burn (ordinality: 'Ordinaltiy: Principal')" during "Occurrence A of Encounter, Performed: Hospital Measures Inpatient"
    - AND: Time >= 1 minute(s) of:"Occurrence A of Procedure, Performed: Cardiac Surgery" starts after start of "Occurrence A of Encounter, Performed: Hospital Measures Inpatient"
- **Denominator Exclusions =**
    - AND:
        - OR: AND: "Patient Characteristic: Patient Characteristic: Clinical trial participant" during "Occurrence A of Encounter, Performed: Hospital Measures Inpatient"
        - OR: AND: "Occurrence A of Encounter, Performed: Hospital Measures Inpatient (discharge datetime < 2 day(s))" starts after start of "Occurrence A of Procedure, Performed: Cardiac Surgery (ordinality: 'Ordinaltiy: Principal')"
        - OR: OR:
            - AND: "Patient Characteristic: Patient Characterisitc: Expired" starts after start of "Occurrence A of Procedure, Performed: Cardiac Surgery (incision datetime)"
            - AND: Time difference <= 6 hour(s) of:"Patient Characteristic: Patient Characterisitc: Expired" starts after end of ("Occurrence A of Procedure, Performed: Hospital Measures JC" during "Occurrence A of Encounter, Performed: Hospital Measures Inpatient")
- **Numerator =**
    - AND: Difference between dates = 2 day(s) of:"Laboratory Test, Result: Laboratory Test Hospital Measures Glucose (result <= 200 mg/dL)" starts after end of ("Occurrence A of Procedure, Performed: Hospital Measures JC" during "Occurrence A of Procedure, Performed: Cardiac Surgery")
    - AND: Difference between dates < 1 day(s) of:"Laboratory Test, Result: Laboratory Test Hospital Measures Glucose (result < 200 mg/dL)" starts after end of ("Occurrence A of Procedure, Performed: Hospital Measures JC" during "Occurrence A of Procedure, Performed: Cardiac Surgery")
- **Denominator Exceptions =**
    - None

Data criteria (QDM Data Elements)

- "Diagnosis, Active: Hospital Measures Burn" using "Hospital Measures Burn Grouping Value Set (2.16.840.1.113883.3.666.05.813)"
- "Diagnosis, Active: Hospital Measures Infection" using "Hospital Measures Infection Grouping Value Set (2.16.840.1.113883.3.666.05.695)"
- "Encounter, Performed: Hospital Measures Inpatient" using "Hospital Measures Inpatient SNOMED-CT Value Set (2.16.840.1.113883.3.666.05.625)"
- "Laboratory Test, Result: Laboratory Test Hospital Measures Glucose" using "Laboratory Test Hospital Measures Glucose SNOMED-CT Value Set (2.16.840.1.113883.3.666.05.816)"
- "Laboratory Test, Result: SBP" using "SBP CPT Value Set (2.16.840.11.113883.3.560.4.20.105)"
- "Patient Characteristic: birth date" using "birth date LOINC Value Set (2.16.840.1.113883.3.560.100.4)"
- "Patient Characteristic: Patient Characterisitc: Expired" using "Patient Characterisitc: Expired Grouping Value Set (2.16.840.1.113883.3.666.05.730)"
- "Patient Characteristic: Patient Characteristic: Clinical trial participant" using "Patient Characteristic: Clinical trial participant SNOMED-CT Value Set (2.16.840.1.113883.3.526.02.643)"
- "Procedure, Performed: Cardiac Surgery" using "Cardiac Surgery Grouping Value Set (2.16.840.1.113883.3.526.03.371)"
- "Procedure, Performed: Hospital Measures JC" using "Hospital Measures JC SNOMED-CT Value Set (1.3.6.1.4.1.33895.1.3.0.31)"
- Attribute: "Ordinality: Ordinaltiy: Principal" using "Ordinaltiy: Principal SNOMED-CT Value Set (2.16.840.1.113883.3.526.02.8001)"

Reporting Stratification

- None

Supplemental Data Elements

- "Patient Characteristic Ethnicity: Ethnicity" using "Ethnicity CDC Value Set (2.16.840.1.114222.4.11.837)"
- "Patient Characteristic Sex: ONC Administrative Sex" using "Administrative Sex Value Set (2.16.840.1.113762.1.4.1)"
- "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)"

Measure Set	CLINICAL QUALITY MEASURE SET 2011-2012

APPENDIX D. MEASURE GROUPING RULES

		Population	Denominator	Numerator	Numerator Exclusion	Denominator Exclusion	Denominator Exception	Measure Population	Measure Observation
Proportion	Grouping Requirements	Required	Required	Required	N/A	Optional	Optional	N/A	N/A
	Quantity Allowed per Grouping	1	1	1+	N/A	1	1	N/A	N/A
Ratio	Grouping Requirements	Required	Required	Required	Optional	Optional	N/A	N/A	N/A
	Quantity Allowed per Grouping	1	1	1+	1	1	N/A	N/A	N/A
Continuous Variables	Grouping Requirements	Required	N/A	N/A	N/A	N/A	N/A	Required	Required
	Quantity Allowed per Grouping	1	N/A	N/A	N/A	N/A	N/A	1	1

APPENDIX E. DISCLAIMER

The eMeasure Value Set Microsoft Excel file exports the value sets associated with a measure. The following disclaimer is provided in the file:

The codes that you are exporting directly reflect the codes you entered into the Measure Authoring Tool. These codes may be owned by a third party and subject to copyright or other intellectual property restrictions. Use of these codes may require permission from the code owner or agreement to a license. It is your responsibility to ensure that your use of any third party code is permissible and that you have fulfilled any notice or license requirements imposed by the code owner. Use of the Measure Authoring Tool does not confer any rights on you with respect to these codes other than those that may be available from the code owner.

APPENDIX F: FUNCTIONS, OPERATORS, TIME RELATIONSHIPS, AND RELATIONSHIPS

Functions: Functions are qualifiers for a QDM element. The functions address specific use cases in the Population Criteria section of an eMeasure: Population, Denominator, Numerator, Exclusion, Exception, and Measure Population. Not all of these functions should be used in the Measure Observation section. The Functions First, Second, Third, Fourth, Fifth, Relative First, Relative Second, and Not should only be used in the Population Criteria sections provided above.

Operators: Operators are used in the creation of syntax to build either measure phrases or system clauses. The operators listed within this appendix are either logical operators, math operators, or comparison operators. This appendix provides a description and an example of the application of each operator.

Time Relationships: Time Relationships are used to indicate the timings between clinical concepts. This appendix provides a description as well as a graphical depiction of each of the available timing indicators.

Relationships: Relationships are used to indicate how one clinical concept relates to another. This appendix provides a description of each of the available relationships.

Function Name	Description	Operator and Quantity Needed	Tool Examples
List Functions			
FIRST	Return the first occurrence of the associated QDM element or phrase. This is the first item in a list. **Example:** ***FIRST("Diagnosis, Active: Diabetes")*** The syntax provided above would return the first item in the following list: ***1. "Diagnosis, Active: Diabetes"*** 2. "Diagnosis, Active: Diabetes" 3. "Diagnosis, Active: Diabetes" 4. "Diagnosis, Active: Diabetes" 5. "Diagnosis, Active: Diabetes"	No	**1) Standalone:** **FIRST("Diagnosis, Active: Diabetes" DURING Measurement Period)** **2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(FIRST("Encounter: Hospital Inpatient" DURING Measurement Period))**
SECOND	Return the second occurrence of the associated QDM element or phrase. This is the second item in a list. **Example:** ***SECOND("Diagnosis, Active: Diabetes")*** The syntax provided above would return the second item in the following list: 1. "Diagnosis, Active: Diabetes" ***2. "Diagnosis, Active: Diabetes"*** 3. "Diagnosis, Active: Diabetes" 4. "Diagnosis, Active: Diabetes" 5. "Diagnosis, Active: Diabetes"	No	**1) Standalone:** **SECOND("Diagnosis, Active: Diabetes" DURING Measurement Period)** **2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(SECOND("Encounter: Hospital Inpatient" DURING Measurement Period))**

Function Name	Description	Operator and Quantity Needed	Tool Examples
THIRD	Return the third occurrence of the associated QDM element or phrase. This is the third item in a list. **Example:** ***THIRD("Diagnosis, Active: Diabetes")*** The syntax provided above would return the third item in the following list: 1. "Diagnosis, Active: Diabetes" 2. "Diagnosis, Active: Diabetes" ***3. "Diagnosis, Active: Diabetes"*** 4. "Diagnosis, Active: Diabetes" 5. "Diagnosis, Active: Diabetes"	No	**1) Standalone:** **THIRD("Diagnosis, Active: Diabetes" DURING Measurement Period)** **2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(THIRD("Encounter: Hospital Inpatient" DURING Measurement Period))**
FOURTH	Return the fourth occurrence of the associated QDM element or phrase. This is the fourth item in a list. **Example: *FOURTH("Diagnosis, Active: Diabetes")*** The syntax provided above would return the fourth item in the following list: 1. "Diagnosis, Active: Diabetes" 2. "Diagnosis, Active: Diabetes" 3. "Diagnosis, Active: Diabetes" ***4. "Diagnosis, Active: Diabetes"*** 5. "Diagnosis, Active: Diabetes"	No	**1) Standalone:** **FOURTH("Diagnosis, Active: Diabetes" DURING Measurement Period)**2**)** **Right Hand .Side:** "Lab Test, Performed: LDL" DURING **(FOURTH("Encounter: Hospital Inpatient" DURING Measurement Period))**

Function Name	Description	Operator and Quantity Needed	Tool Examples
FIFTH	Return the fifth occurrence of the associated QDM element or phrase. This is the fifth item in a list or phrase. **Example:** ***FIFTH("Diagnosis, Active: Diabetes")*** The syntax provided above would return the fifth item in the following list: 1. "Diagnosis, Active: Diabetes" 2. "Diagnosis, Active: Diabetes" 3. "Diagnosis, Active: Diabetes" 4. "Diagnosis, Active: Diabetes" **5. "Diagnosis, Active: Diabetes"** 6. "Diagnosis, Active: Diabetes" 7. "Diagnosis, Active: Diabetes"	No	**1) Standalone: FIFTH("Diagnosis, Active: Diabetes" DURING Measurement Period)** **2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(FIFTH("Encounter: Hospital Inpatient" DURING Measurement Period))**
LAST	Return the last occurrence of the associated QDM element or phrase. This is the last item in a list or phrase. **Example: *FIFTH("Diagnosis, Active: Diabetes")*** The syntax provided above would return the last item in the following list:1. "Diagnosis, Active: Diabetes"2. "Diagnosis, Active: Diabetes"3. "Diagnosis, Active: Diabetes"4. "Diagnosis, Active: Diabetes"5. "Diagnosis, Active: Diabetes"6. "Diagnosis, Active: Diabetes"**7. "Diagnosis, Active: Diabetes"**	No	**1) Standalone: LAST("Diagnosis, Active: Diabetes" DURING Measurement Period)2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(LAST("Encounter: Hospital Inpatient" DURING Measurement Period))**
Statistical Functions			

Function Name	Description	Operator and Quantity Needed	Tool Examples
COUNT	Returns a True/False based on a count of a particular QDM element, with or without an attribute, or phrase and the result specified. The result must be specified as a positive integer. **Example:** ***COUNT("Encounter: Hospital Inpatient" DURING Measurement Period) > 4*** The syntax provided above would return "True" if and only if there were more than 4 hospital inpatient encounters during the measurement period.		**1) Standalone:** **COUNT("Encounter: Hospital Inpatient" DURING Measurement Period) > 4** **2) Right Hand Side:** "Lab Test, Performed: LDL" DURING **(COUNT("Encounter: Hospital Outpatient" DURING Measurement Period) > 2)**
COUNTDISTINCT	Returns a True/False based on the distinct count of a QDM element with an assigned data type specific attribute(s) that equates to "is present." Note: When using this function, an attribute must be added to define how the QDM Element should be counted. The query is performed based on the given attribute(s) and filtered by the particular QDM data type to which it belongs (e.g., Encounter). The result must be specified as a positive integer. **Example:COUNTDISTINCT("Encounter: Hospital Inpatient (admission datetime is present)" DURING Measurement Period) > 4** The syntax provided above would return "True" if and only if there were more than 4 hospital inpatient encounters during the measurement period that had a different admission datetime.	Yes	**1) Standalone:** **COUNTDISTINCT("Encounter: Hospital Inpatient (admission datetime is present)" DURING Measurement Period) > 42)** **Right Hand Side:** "Lab Test, Performed: LDL" DURING **(COUNTDISTINCT("Encounter: Hospital Outpatient (discharge datetime is present)" DURING Measurement Period) > 2)**

Function Name	Description	Operator and Quantity Needed	Tool Examples
MAX	Returns a True/False based on the maximum result value specified for a data type specific attribute of a QDM element. The result must be specified as a number. **Example:** ***MAX("Physical Exam, Result: Systolic Blood Pressure (result < 90 mm/Hg)" DURING Measurement Period)*** The syntax provided above would return "True" if and only if the maximum systolic blood pressure value recorded for a patient during the measurement period was less than 90 mm/Hg.	No	**1) Standalone:** MAX("Physical Exam, Finding: Systolic Blood Pressure (result < 120 mm/Hg)" DURING Measurement Period) **2) Right Hand Side:** "Physical Exam, Performed: Systolic Blood Pressure" DURING (MAX("Lab Test, Result: HgbA1c (result < 9%)"))
Median	For an ordered set of numbers (lowest to highest), the median is the middle value in the set. Median should not be confused with average (mean), which is the sum of numbers divided by the count of numbers in a set. When there is an odd number of values in the set, the median is the value that separates the higher half from the lower half. For example, consider the following list of numbers: 1, 6, 7, 21, and 25. The median is 7. When there is an even number of items, the median is the average of the middle two items. For example, consider the following list of numbers: 1, 2, 3, 7, 8, and 100. The median is 5 (i.e., average of 3 and 7). **Example:**	No	**Standalone:** MEDIAN(DATEDIFF("Encounter: Hospital Inpatient - AMI (facility location arrival datetime)" and "Medication, Administered: Fibrinolytic Administration (start datetime)"))

Function Name	Description	Operator and Quantity Needed	Tool Examples
	MEDIAN(DATEDIFF("Encounter: Hospital Inpatient - AMI (facility location arrival datetime)" and "Medication, Administered: Fibrinolytic Administration (start datetime)")) The syntax provided above returns the median for the time differences determined by subtracting the respective starting times of Fibrinolytic Administrations from the respective arrival datetimes of inpatient admissions.		
MIN	Returns a True/False based on the minimum result value specified for a data type specific attribute of a QDM element. The result must be specified as a number. **Example:*MIN("Physical Exam, Result: Diastolic Blood Pressure (result < 90 mm/Hg)" DURING Measurement Period)***The syntax provided above would return "True" if and only if the minimum systolic blood pressure value recorded for a patient during the measurement period was less than 90 mm/Hg.	No	**1) Standalone: MIN("Physical Exam, Finding: Systolic Blood Pressure (result < 120 mm/Hg)" DURING Measurement Period)** **2) Right Hand Side:** "Physical Exam, Performed: Systolic Blood Pressure" DURING **(MIN("Lab Test, Result: HgbA1c (result < 9%)"))**

Function Name	Description	Operator and Quantity Needed	Tool Examples
RELATIVEFIRST	Return the relative first item in a list (i.e., Immediate Prior). Note: This function allows timing of a given list of clinical events to be compared, where each event must be considered in order of when it occurred in conjunction with the event that was immediately after it. As a result, this function should always be used in conjunction with the RELATIVESECOND function. **Example:** ***NOT((RELATIVEFIRST("Diagnosis, Active: ADHD")) Starts Before Start Of (RELATIVESECOND("Diagnosis, Active: ADHD")) > 6 months)*** The syntax provided above asserts that there was never an active diagnosis of ADHD that started before the start of any other active diagnosis of ADHD by greater than 6 months.	No	**1) Left Hand Side:** **(RELATIVEFIRST("Physical Exam, Finding: Systolic Blood Pressure (result is present)"))** ENDS BEFORE START OF (RELATIVESECOND("Physical Exam, Finding: Systolic Blood Pressure (result is present)")) > 6 months **2) Right Hand Side:** (RELATIVESECOND("Physical Exam, Finding: Systolic Blood Pressure (result is present)")) STARTS AFTER START OF **(RELATIVEFIRST("Physical Exam, Finding: Systolic Blood Pressure (result is present)"))** > 6 months
RELATIVESECOND	Return the relative second item in a list (i.e., Current). Note: This function allows timing of a given list of clinical events to be compared, where each event must be considered in order of when it occurred in conjunction with the event that was immediately preceding it. As a result, this function should always be used in conjunction with the	No	**1) Left Hand Side:** **(RELATIVESECOND("Physical Exam, Finding: Systolic Blood Pressure (result is present)"))** ENDS BEFORE START OF (RELATIVEFIRST("Physical Exam, Finding: Systolic Blood Pressure (result is present)")) > 6 months

Function Name	Description	Operator and Quantity Needed	Tool Examples
	RELATIVEFIRST function. **Example:** ***NOT((RELATIVEFIRST("Diagnosis, Active: ADHD")) Ends Before Start Of (RELATIVESECOND("Diagnosis, Active: ADHD")) > 6 months)***The syntax provided above asserts that there was never an active diagnosis of ADHD that started before the start of any other active diagnosis of ADHD by greater than 6 months.		**2) Right Hand Side:** (RELATIVEFIRST("Physical Exam, Finding: Systolic Blood Pressure (result is present)")) STARTS AFTER START OF **(RELATIVESECOND("Physical Exam, Finding: Systolic Blood Pressure (result is present)"))** > 6 months
Logical Functions			
NOT	Negates QDM element with associated attribute(s) or phrase. Note: When an attribute is indicated for a QDM element at this level, what is being negated is the occurrence of a particular QDM element with that attribute. **Example:** ***NOT("Lab Test, Result: LDL (result is present)" SAS Measurement Period)*** The above syntax indicates that there was not a LDL reading performed that met the following criteria: 1) had a documented result, **and** 2) started after the start of the measurement period. However, there could have been an LDL reading that occurred that fits into the following criteria: 1) did not have a documented result, **and** 2) started after the start of the measurement period.	No	**1) Standalone: NOT("Physical Exam, Result: Systolic Blood Pressure (result is present)" DURING Measurement Period)** **2) Left Hand Side: (NOT("Physical Exam, Result: Systolic Blood Pressure (result < 120 mm/Hg"))** STARTS AFTER START OF Measurement Period **3) Right Hand Side:** "Physical Exam, Performed: Systolic Blood Pressure" DURING **(NOT("Encounter: Office Visit (start datetime is present)") DURING Measurement Period)**
Math Functions			

Function Name	Description	Operator and Quantity Needed	Tool Examples
ABS	Returns a True/False based on the absolute result value specified for a data type specific attribute value of a QDM element. The result must be specified as a positive number. **Example:** ***ABS("Physical Exam, Result: Diastolic Blood Pressure(result is present)" DURING Measurement Period) > 120***The syntax provided above would return "True" if and only if the absolute value for a diastolic blood pressure reading was greater than 120.	Yes	**1) Standalone: ABS("Physical Exam, Result: Systolic Blood Pressure (result is present)" DURING Measurement Period) > 80** **2) Left-Hand Side: (ABS("Physical Exam, Result: Systolic Blood Pressure (result is present)") > 80)** STARTS AFTER START OF Measurement Period
ROUND	Returns a True/False based on the result value specified for a rounded data type specific attribute value of a QDM element. The result must be specified as a positive number. **Example:** ***ROUND("Physical Exam, Result: Diastolic Blood Pressure (result is present)" DURING Measurement Period) > 140 mmHg*** The syntax provided above would return "True" if and only if the rounded diastolic blood pressure value recorded for a patient during the measurement period was greater than 140 mmHg.	Yes	**1) Standalone: ROUND("Physical Exam, Result: Diastolic Blood Pressure (result is present)" DURING Measurement Period) > 140** **2) Left-Hand Side: (ROUND("Physical Exam, Result: Diastolic Blood Pressure (result is present)") > 140)** STARTS AFTER START OF Measurement Period

Function Name	Description	Operator and Quantity Needed	Tool Examples
SUM	Returns a True/False based on the result value specified for a summed data type specific attribute value of a QDM element. The result must be specified as a positive number. **Example:** ***SUM("Encounter, Performed: Inpatient (length of stay is present)" DURING Measurement Period) > 48 HOURS*** The syntax provided above would return "True" if and only if the summed overall length of stay of Inpatient Encounters was greater than 48 hours.	Yes	**1) Standalone:** **SUM("Encounter, Performed: Inpatient (length of stay is present)" DURING Measurement Period) > 48 HOURS** **2) Left-Hand Side:** **(SUM("Encounter, Performed: Inpatient (length of stay is present)"** STARTS AFTER START OF "Encounter: Inpatient Psych Visit") **> 48HOURS** **3) Right-Hand Side:** "Medication, Administered: Anti-depressant" ENDS BEFORE START OF **(SUM("Encounter, Performed: Inpatient (length of stay is present)" DURING Measurement Period) > 48 HOURS)**
Date/Time Functions			
ADDDATE	Add date intervals to a QDM or Measurement Period type element. **Example:** ***LAST("Laboratory Test, Result: Kt/V (result is present)") STARTS BEFORE START OF (ADDDATE(Measurement End Date ADDED TO 123 DAYS)) ≤ 136 DAYS***The syntax provided above asserts that the last documented Kt/V lab result started before or during the Measurement End Date (+ 123 days) by less than or equal to 136 days.	No	**1) Standalone:** **ADDDATE(Measurement End Date ADDED TO 123 DAYS)** **2) Right-Hand Side:** LAST("Laboratory Test, Result: Kt/V (result is present)") STARTS BEFORE START OF **(ADDDATE(Measurement End Date ADDED TO 123 DAYS))** ≤ 136 HOURS

Function Name	Description	Operator and Quantity Needed	Tool Examples
ADDTIME	Add time intervals to a QDM or Measurement Period type element. **Example:** ***LAST("Laboratory Test, Result: Kt/V (result is present)") STARTS BEFORE START OF (ADDDATE(Measurement End Date ADDED TO 60 HOURS)) ≤ 136 HOURS*** The syntax provided above asserts that the last documented Kt/V lab result started before or during the Measurement End Date (+ 60 hours) by less than or equal to 136 hours.	No	**1) Standalone:** **ADDTIME(Measurement End Date ADDED TO 60 HOURS)** **2) Right-Hand Side:** LAST("Laboratory Test, Result: Kt/V (result is present)") STARTS AFTER START OF **(ADDTIME(Measurement End Date ADDED TO 60 HOURS))** ≤ 136 HOURS
SUBDATE	Subtract date intervals from a QDM or Measurement Period type element. **Example:** ***"Laboratory Test, Result: Kt/V (result is present)" STARTS AFTER START OF (SUBDATE(Measurement End Date SUBTRACTED FROM 238 days)) ≤ 135 DAYS*** The syntax provided above asserts that a Kt/V lab with a documented result started before or during the Measurement End Date (- 238 days) by less than or equal to 135 days.	No	**1) Standalone:** **SUBDATE(Measurement End Date SUBTRACTED FROM 238 days)** **2) Right-Hand Side:** "Laboratory Test, Result: Kt/V (result is present)" STARTS BEFORE START OF **(SUBDATE(Measurement End Date SUBTRACTED FROM 238 days))** ≤ 135 DAYS

Function Name	Description	Operator and Quantity Needed	Tool Examples
SUBTIME	Subtract time intervals from a QDM or Measurement Period type element. **Example:** ***"Laboratory Test, Result: Kt/V (result is present)" STARTS BEFORE OR DURING SUBTIME(Measurement End Date SUBTRACTED FROM 60 HOURS) ≤ 135 HOURS*** The syntax provided above asserts that a Kt/V lab with a documented result started before or during the Measurement End Date (- 60 hours) by less than or equal to 135 hours.	No	**1) Standalone:** **SUBTIME(Measurement End Date SUBTRACTED FROM 60 HOURS)** **2) Right-Hand Side:** "Laboratory Test, Result: Kt/V (result is present)" STARTS AFTER START OF **(SUBTIME(Measurement End Date SUBTRACTED FROM 60 HOURS))** ≤ 135 HOURS
DATEDIFF	Returns a True/False based on the resulting interval specified for the date difference between two QDM elements. **Example:** ***DATEDIFF("Encounter: Hospital Inpatient - AMI (discharge datetime is present)" and "Medication, Administered: Fibrinolytic Administration (start datetime is present)") < 1 DAYS*** The above syntax returns "True" if and only if the amount of time between the discharge datetime for an AMI patient and the starting time of the Fibrinolytic Administration is less than 1 day.	Yes	**1) Standalone:** **DATEDIFF("Medication, Administered: Fibrinolytic Administration (start datetime is present)" AND "Encounter: Hospital Inpatient - AMI (admission datetime is present)") > 4 HOURS** **2) Right-Hand Side:** "Procedure, Performed: Initial ECG" STARTS BEFORE START OF **(DATEDIFF("Medication, Administered: Fibrinolytic Administration (start datetime is present)" AND "Encounter: Hospital Inpatient - AMI (start datetime is present)") > 1 DAYS)**
TIMEDIFF	Returns a True/False based on the resulting interval specified for the time difference between two QDM elements. **Example:** ***TIMEDIFF("Encounter: Hospital Inpatient - AMI (facility location arrival datetime is present)" AND "Medication, Administered: Fibrinolytic***	Yes	**1) Standalone:** **TIMEDIFF("Medication, Administered: Fibrinolytic Administration (start datetime is present)" AND "Encounter: Hospital Inpatient - AMI (start datetime is present)") > 30 MINUTES** **2) Right hand Side:** "Procedure, Performed: Initial ECG" STARTS BEFORE START OF

Function Name	Description	Operator and Quantity Needed	Tool Examples
	Administration (start datetime is present)") > 30 MINUTES The above syntax returns "True" if and only if the amount of time between the arrival time for a AMI patient and the starting time of the Fibrinolytic Administration was greater than 30 minutes.		**(TIMEDIFF("Medication, Administered: Fibrinolytic Administration (start datetime is present)" AND "Encounter: Hospital Inpatient - AMI (start datetime is present)") > 30 MINUTES)**
MONTH	Returns a True/False based on the the resulting month integer specified (1 - 12) for a given QDM element. **Example:*MONTH("Medication, Administered: Pneumococcal Vaccination") > 9***The above syntax returns "True" if and only if the administered pneumococcal vaccination was given after September (i.e., the 9th month).	Yes	**1) Standalone: MONTH("Medication, Administered: Pneumococcal Vaccination") > 9**
Miscellaneous Functions			
CURTIME	Return the current time	Yes	Returns the current time
NOW	Return the current date and time	Yes	Returns the current date and time
WEEK	Returns the week of year within which the associated QDM element occurs. The result should be given as an integer, ranging from 1 to 52.	Yes	Returns the week number
WEEKDAY	Returns the day of the week for the associated QDM element. The result should be given as an integer, ranging from 1 (Sunday) to 7 (Saturday).	Yes	Returns the weekday index
WEEKOFYEAR	Return the calendar week of the date of a QDM element (i.e., 1-53)	Yes	Returns the calendar week of the date (0-53)
YEARWEEK	Return the year and week a QDM element occurred	Yes	Returns the year and week
DAYOFMONTH	Return the day of the month a QDM element occurred (0-31)	Yes	Returns the day of the month (0-31)
DAYOFWEEK	Return the day within a week that a QDM element occurred	Yes	Returns the weekday index

Function Name	Description	Operator and Quantity Needed	Tool Examples
DAYOFYEAR	Return the day of the year a QDM element occurred (1-366)	Yes	Returns the day of the year (1-366)
HOUR	Extract the hour the QDM element occurred	Yes	Extracts the hour
MINUTE	Return the minute the QDM element occurred	Yes	Returns the minute
SEC	Return the second (0-59) the QDM element occurred	Yes	Returns the second (0-59)
YEAR	Return the year the QDM element occurred	Yes	Returns the year
TIME	Return the time the QDM element occurred	Yes	Extracts the time portion of the expression passed
POSITION	Return the position of a QDM element in a list (e.g., First, Second, Third). Position desired must be specified as a result.	Yes	Synonym for locate
AVG	Return the average value of the specified QDM element(s)	Yes	Returns the average value
STDDEV	Return the population standard deviation	Yes	Returns the population standard deviation
VARIANCE	Return the population standard variance	Yes	Returns the population standard variance

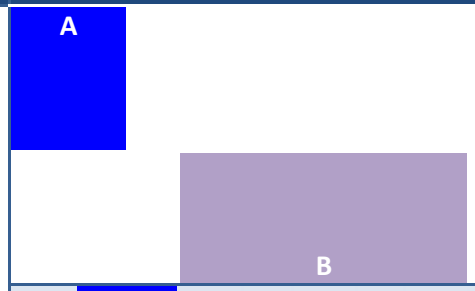
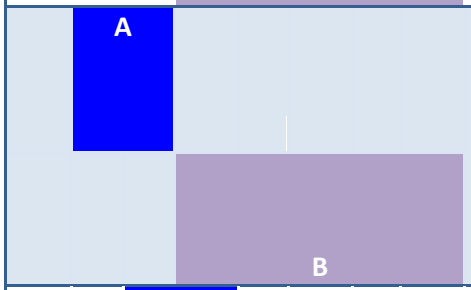
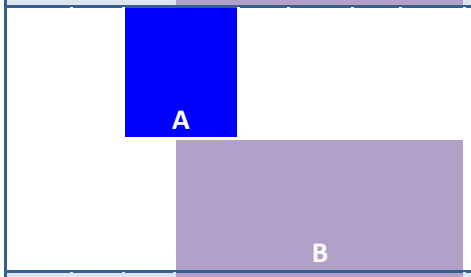
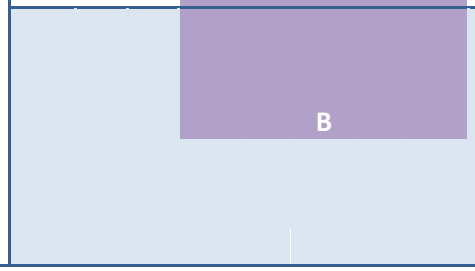
Operator Name	Description		Example
Logical Operators			
AND	Used to conjoin two or more QDM elements or phrases through the use of 'AND'. **Example:** ***("Encounter: Hospital Inpatient" AND "Physical Exam, Performed: Weight Measurement") DURING Measurement Period*** The syntax provided above asserts that the following must have occurred during the measurement period: 1) A Hospital Inpatient Encounter **-AND-** 2) a Physical Exam Performed for Weight Measurement ***Note: The addition of any measure phrase should always be preceded by an 'AND' or an 'OR'.***		**1) Standalone: ("Encounter: Hospital Inpatient" AND "Diagnosis, Active: Presumptive Pneumonia")** **2) Left Hand Side: ("Encounter: Hospital Inpatient" AND "Diagnosis, Active: Presumptive Pneumonia")** DURING Measurement Period **3) Right Hand Side:** "Intervention, Performed: Hospital Measures - Comfort Measures Only Intervention" STARTS AFTER START OF **(("Encounter: Hospital Inpatient" AND "Diagnosis, Active: Presumptive Pneumonia") DURING Measurement Period)**
OR	Used to conjoin two or more QDM elements or phrases through the use of 'OR'. **Example:** ***("Encounter: Hospital Inpatient" OR "Encounter: Hospital Outpatient") DURING Measurement Period*** The syntax provided above asserts that one of the following must have occurred during the measurement period: 1) A Hospital Inpatient Encounter **-OR-** 2) A Hospital Outpatient Encounter ***Note: The addition of any measure phrase should always be preceded by an 'AND' or an 'OR'.***		**1) Standalone: ("Encounter: Hospital Inpatient" OR "Encounter: Hospital Inpatient")** **2) Left Hand Side: ("Encounter: Hospital Inpatient" OR "Encounter: Hospital Inpatient")** DURING Measurement Period **3) Right Hand Side:** "Physical Exam, Performed: Weight Measurement" STARTS AFTER START OF **(("Encounter: Hospital Inpatient" OR "Encounter: Hospital Inpatient") DURING Measurement Period)**
Math Operators			

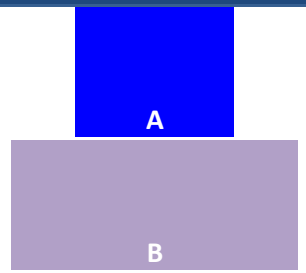
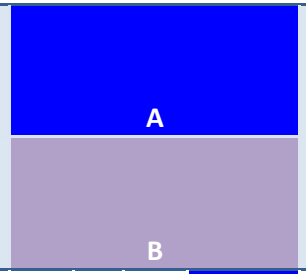
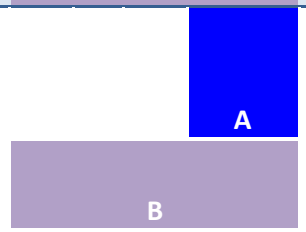
Operator Name	Description		Example
SUBTRACTED FROM	Subtract operator. This operator should be used in coordination with either the SUBTIME or SUBDATE function. It is used to subtract a particular period of time to a QDM element. **Example:*SUBDATE(Measurement End Date SUBTRACTED FROM 165 DAYS)***The syntax provided above asserts that 165 days should be subtracted from the measurement end date.		**1) Standalone:** **SUBDATE(Measurement End Date SUBTRACTED FROM 238 DAYS)3) Right Hand Side:** "Laboratory Test, Result: Kt/V (result is present)" STARTS AFTER START OF **(SUBDATE(Measurement End Date SUBTRACTED FROM 238 DAYS))** ≤ 135 DAYS
ADDED TO	Addition operator. This operator should be used in coordination with either the ADDTIME or ADDDATE function. It is used to add a particular period of time to a QDM element. **Example:** ***ADDDATE(Measurement Start Date ADDED TO 165 DAYS)*** The syntax provided above asserts that 165 days should be added to the measurement start date.		**1) Standalone:** **ADDDATE(Measurement Start Date ADDED TO 7 DAYS)** **2) Right Hand Side:** "Intervention, Result: Assessing for Non-Adherence with peritoneal prescription, sampling, collection (result is present)" STARTS BEFORE START OF **(ADDDATE(Measurement End Date ADDED TO 7 DAYS))** ≤ 136 DAYS
Comparison Operators			
LESS THAN	Less than operator. In a mathematical expression, this comparison operator is used to denote that the value of the left hand side is less than the value of the right hand side (e.g., x < y). In clinical terms, the left hand side might equate to the value of a data type specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right hand side would equate to a specified quantity with/without an associated unit. **Example:** ***"Encounter: Hospital Inpatient (duration < 120 DAYS)"*** The syntax above asserts that the Hospital Inpatient Encounter was less than 120 days in length.		**1) Standalone:** **("Encounter: Hospital Inpatient (duration < 120 DAYS)")** **2) Left Side:** **(("Encounter: Hospital Inpatient (duration < 120 DAYS"))** DURING Measurement Period **3) Right Side:** "Diagnosis, Active: AMI" STARTS AFTER START OF **(("Encounter: Hospital Inpatient (duration < 120 days)") DURING Measurement Period)** < 1 DAYS

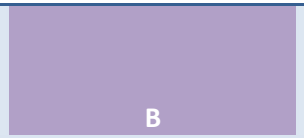
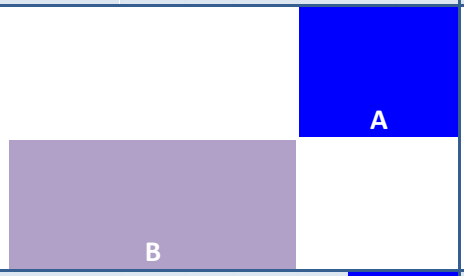
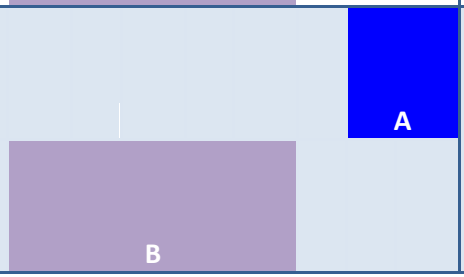
Operator Name	Description		Example
EQUAL TO	Equal operator. In a mathematical expression, this comparison operator is used to denote that the value of the left hand side is equal to the value of the right hand side (e.g., x = y). In clinical terms, the left hand side might equate to the value of a data type specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right hand side would equate to a specified quantity with/without an associated unit. **Example:*"Encounter: Hospital Inpatient (duration = 120 DAYS)"***The syntax above asserts that the Hospital Inpatient Encounter must be equal to 120 days in length.		**1) Standalone: ("Encounter: Hospital Inpatient (duration = 120 DAYS)")** **2) Left Side: (("Encounter: Hospital Inpatient (duration = 120 DAYS)")) DURING** Measurement Period **3) Right Side:** "Diagnosis, Active: AMI" STARTS AFTER START OF **(("Encounter: Hospital Inpatient (duration = 120 DAYS)") DURING Measurement Period)** < 1 DAYS
GREATER THAN OR EQUAL TO	Greater Than Or Equal To operator. In a mathematical expression, this comparison operator is used to denote that the value of the left hand side is greater than or equal to the value of the right hand side (e.g., x ≥ y). In clinical terms, the left hand side might equate to the value of a data type specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right hand side would equate to a specified quantity with/without an associated unit. **Example:** ***"Encounter: Hospital Inpatient (duration ≥ 120 DAYS)"*** The syntax above asserts that the Hospital Inpatient Encounter was greater than or equal to 120 days in length.		**1) Standalone: ("Encounter: Hospital Inpatient (duration ≥ 120 DAYS)")** **2) Left Side: (("Encounter: Hospital Inpatient (duration ≥ 120 DAYS)")) DURING** Measurement Period **3) Right Side:** "Diagnosis, Active: AMI" STARTS AFTER START OF **(("Encounter: Hospital Inpatient (duration ≥ 120 DAYS)") DURING Measurement Period)** < 1 DAYS

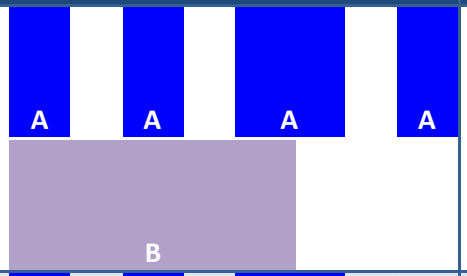
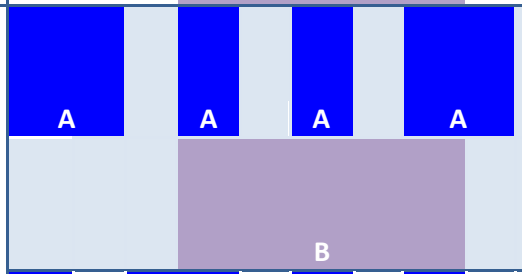
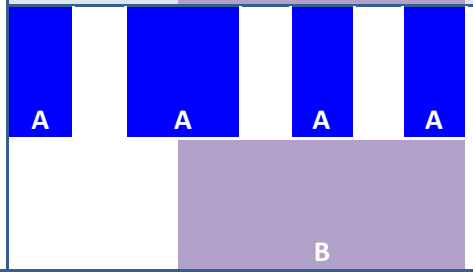
Operator Name	Description		Example
GREATER THAN	Greater Than operator. In a mathematical expression, this comparison operator is used to denote that the value of the left hand side is greater than the value of the right hand side (e.g., x > y). In clinical terms, the left hand side might equate to the value of a data type specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right hand side would equate to a specified quantity with/without an associated unit. **Example:*"Encounter: Hospital Inpatient (duration > 120 DAYS)"***The syntax above asserts that the Hospital Inpatient Encounter was greater than 120 days in length.		**1) Standalone:** **("Encounter: Hospital Inpatient (duration > 120 DAYS)")** **2) Left Side:** **(("Encounter: Hospital Inpatient (duration > 120 DAYS)"))** DURING Measurement Period **3) Right Side:** "Diagnosis, Active: AMI" STARTS AFTER START OF **(("Encounter: Hospital Inpatient (duration > 120 DAYS)") DURING Measurement Period)** < 1 DAYS
LESS THAN OR EQUAL TO	Less Than Or Equal To operator. In a mathematical expression, this comparison operator is used to denote that the value of the left hand side is less than or equal to the value of the right hand side (e.g., x ≤ y). In clinical terms, the left hand side might equate to the value of a data type specific attribute of a QDM or the timing associated between one or more QDM elements or phrases, while the right hand side would equate to a specified quantity with/without an associated unit. **Example:** ***"Encounter: Hospital Inpatient (duration ≤ 120 DAYS)"*** The syntax above asserts that the Hospital Inpatient Encounter was less than or equal to 120 days in length.		**1) Standalone:** **("Encounter: Hospital Inpatient (duration ≤ 120 DAYS)")** **2) Left Side:** **(("Encounter: Hospital Inpatient (duration ≤ 120 DAYS"))** DURING Measurement Period **3) Right Side:** "Diagnosis, Active: AMI" STARTS AFTER START OF **(("Encounter: Hospital Inpatient (duration ≤ 120 DAYS)") DURING Measurement Period)** < 1 DAYS
Miscellaneous Operators			
DIVIDED BY	Division operator		Divided by
IS NOT NULL	NOT NULL value test		Is not null
IS NULL	NULL value test		Is null
LIKE	Simple pattern matching		Like

Operator Name	Description		Example
NOT EQUAL TO	Not Equal To value test	Not equal to	
TIMES	Times operator	Times	

Time Relationships	Illustration	Time Relationships Corresponding to Timeline	Time Relationships Indicator Description
"before"		STARTS BEFORE START OF	A relationship in which the source act's effective time starts before the beginning of the effective start time of the target.
		ENDS BEFORE START OF	A relationship in which the source act terminates before the target act's effective time.
		STARTS BEFORE START OF	A relationship in which the source act's effective time starts before the beginning of the effective start time of the target.
		ENDS BEFORE START OF	A relationship in which the source act terminates before the target act's effective time.
		ENDS AFTER START OF	A relationship in which the source act terminates after the target act's effective time.
		ENDS DURING	A relationship in which the source act terminates within the target act's effective time.
		STARTS CONCURRENT WITH	A relationship in which the source act's effective time starts with the start of the target act's effective time.
		STARTS DURING	A relationship in which the source act's effective time begins within the target act's effective time.

Time Relationships	Illustration	Time Relationships Corresponding to Timeline	Time Relationships Indicator Description
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		STARTS DURING	A relationship in which the source act's effective time begins within the target act's effective time.
		ENDS DURING	A relationship in which the source act terminates within the target act's effective time.
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		CONCURRENT WITH	A relationship in which the source act's effective time is the same as the target act's effective time.
		DURING	A relationship in which the source act's effective time is wholly within the target act's effective time.
		STARTS AFTER START OF	A relationship in which the source act starts after the start of the target Act
		ENDS CONCURRENT WITH	A relationship in which the source act's effective time ends with the end of the target act's effective time.

Time Relationships	Illustration	Time Relationships Corresponding to Timeline	Time Relationships Indicator Description
		STARTS DURING	A relationship in which the source act's effective time begins within the target act's effective time.
		ENDS DURING	A relationship in which the source act terminates within the target act's effective time.
		ENDS AFTER END OF	A relationship in which the source act terminates after the target act terminates.
		STARTS DURING	A relationship in which the source act's effective time begins within the target act's effective time.
"after"		ENDS AFTER END OF	A relationship in which the source act terminates after the target act terminates.
		ENDS AFTER END OF	A relationship in which the source act terminates after the target act terminates.

Time Relationships	Illustration	Time Relationships Corresponding to Timeline	Time Relationships Indicator Description
"after or simultaneous to"		STARTS AFTER START OF	A relationship in which the source act starts after the start of the target Act.
"before or simultaneous to"		STARTS BEFORE OR DURING	A relationship in which the source act's effective time starts before the start of the target or starts during the target's effective time.
		ENDS BEFORE OR DURING	A relationship in which the source act terminates before the target act terminates.

Relationship	Relationship Code	Example
Authorized By	AUTH	'A' is authorized or certified by 'B' This relationship is provided to allow a measure developer to specify that a patient has provided consent.
Causes	CAUS	''A' caused 'B' An assertion that an act was the cause of another act. Examples: *a growth of Staphylococcus aureus may be considered the cause of an abscess *contamination of the infusion bag was deemed to be the cause of the infection that the patient experienced *lack of staff on the shift was deemed to be a supporting factor (proximal factor) causing the patient safety incident where the patient fell out of bed because the bed-sides had not been put up which caused the night patient to fall out of bed
is derived from	DRIV	'A' is derived from 'B' This relationship is provided to allow a measure developer to be able to indicate a value that is calculated from other values. An anion-gap observation can be associated as being derived from

Relationship	Relationship Code	Example
		given sodium-, (potassium-,), chloride-, and bicarbonate-observations.
has goal	GOAL	'A' has goal of 'B' A goal that one defines given a patient's health condition. Subsequently planned actions aim to meet that goal. 'A' is an observation, while 'B' must be an observation in goal mood.
has outcome	OUTC	'A' has outcome of 'B' An observation that should follow or does actually follow as a result or consequence of a condition or action (sometimes called "post-conditional".) Example: The outcome of a diagnostic study was 'x' diagnosis