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Centers for Medicare & Medicaid Services and The Office of  
the National Coordinator for Health Information Technology

CMS Alliance to Modernize Healthcare  
Federally Funded Research and Development Center



An Open Source Meaningful Use Stage 2 Clinical Quality Measure Testing  
and Certification Tool

## Cypress User Guide

Version 3.0

September 28, 2016

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## Record of Changes

Version	Date	Author/Owner	Description of Change
3.0	September 28, 2016	ONC/CAMH	Version 3.0 for release

## About the CMS Alliance to Modernize Healthcare

The Centers for Medicare & Medicaid Services (CMS) sponsors the CMS Alliance to Modernize Healthcare (CAMH), the first Federally Funded Research and Development Center (FFRDC) dedicated to strengthening our nation's healthcare system.

The CAMH FFRDC enables CMS, the Department of Health and Human Services (HHS), and other government entities to access unbiased research, advice, guidance, and analysis to solve complex business, policy, technology, and operational challenges in health mission areas. The FFRDC objectively analyzes long-term health system problems, addresses complex technical questions, and generates creative and cost-effective solutions in strategic areas such as quality of care, new payment models, and business transformation.

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The CAMH FFRDC applies a combination of large-scale enterprise systems engineering and specialized health subject matter expertise to achieve the strategic objectives of CMS, HHS, and other government organizations charged with health-related missions. As a trusted, not-for-profit adviser, the CAMH FFRDC has access, beyond what is allowed in normal contractual relationships, to government and supplier data, including sensitive and proprietary data, and to employees and government facilities and equipment that support health missions.

CMS conducted a competitive acquisition in 2012 and awarded the CAMH FFRDC contract to The MITRE Corporation (MITRE). MITRE operates the CAMH FFRDC in partnership with CMS and HHS, and maintains a collaborative alliance of partners from nonprofits, academia, and industry. This alliance provides specialized expertise, health capabilities, and innovative solutions to transform delivery of the nation's healthcare services. Government organizations and other entities have ready access to this network of partners, including RAND Health, the Brookings Institution, and other leading healthcare organizations. This includes select qualified small and disadvantaged business.

The FFRDC is open to all CMS and HHS Operating Divisions and Staff Divisions. In addition, government entities outside of CMS and HHS can use the FFRDC with permission of CMS, CAMH's primary sponsor.

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# 1. Introduction

Cypress v3.0 is the rigorous and repeatable testing tool of Electronic Health Records (EHR) and EHR modules used in calculating Meaningful Use (MU) Stage 2 Clinical Quality Measures (CQM). Cypress v3.0 is the official testing tool for the 2015 EHR Certification program supported by the Office of the National Coordinator for Health Information Technology (ONC). The 2015 Edition final rule, published by the ONC, updates the ONC Health Information Technology (IT) Certification Program and includes certification criteria to support electronic clinical quality measurement (eCQM) and reporting across the healthcare ecosystem. The 2015 Edition eCQM certification criteria also support the requirements of the Medicare and Medicaid EHR Incentive Programs and other Centers for Medicare & Medicaid Services (CMS) program requirements.

ONC and CMS developed the Cypress v3.0 User Guide for test proctors who test and certify EHR systems at Authorized Testing Labs (ATL). EHR software engineers, quality assurance engineers, and production release engineers may draw on the guide when they use Cypress in a pre-testing mode to understand how their EHR product will perform in an ATL-conducted operational test.

This guide provides instructions on how to use the open source Cypress v3.0 tool (it is assumed the user has downloaded the software). It addresses the requirements and steps for testing EHR technology for calculating and reporting eCQMs.

The Cypress tool is freely available for use or adoption by the health IT community, including EHR vendors and testing labs. The open source project website at [Project Cypress](#) provides information detailing the set up and configuration of Cypress v3.0 open source software.

## 2. Cypress Testing Capabilities

To achieve certification pursuant to the most recent 2015 standards, each EHR must show that it meets four criteria by demonstrating required capabilities specified in the regulation and described in the following subsections. The Cypress v3.0 software verifies four required eCQM capabilities for EHR certification (Capture/Record and Export, Import and Calculate, Electronic Submission, and Data Filtering), as described in the following sections.

### 2.1 Capture/Record and Export

Cypress v3.0 supports the requirements for Capture/Record and Export capabilities as follows:

- **Capture/Record** – To be certified in accordance with 45 CFR §170.314(c), EHR technology must be able to electronically capture/record all of the data identified in the specified procedure necessary to calculate each eCQM. Data required for eCQM exclusions or exceptions must be codified entries. These entries may include specific terms as defined by each eCQM, or may include codified expressions of “patient reason,” “system reason,” or “medical reason”.
- **Export** – As provided in 45 CFR §170.314(c)(1), EHR technology must be able to electronically export a data file formatted in accordance with the Quality Reporting Document Architecture (QRDA) Category I standard that includes all of the data captured for each and every eCQM for which EHR technology is being certified.

The functionality requirement for Capture/Record and Export specifies that a system user can record and export individual, patient-level eCQM data formatted to the Health Level Seven International (HL7) QRDA Category I Release 3 Implementation Guide (IG) at any time the user chooses, for one or multiple patients, without needing developer support. The requirement for Capture/Export is part of the certification criteria necessary to satisfy the 2015 Edition Base EHR definition. The capability to export eCQM data serves two purposes: (1) a provider or health system can view and verify their eCQM results for quality improvement on a near real-time basis, and (2) providers can export their results to multiple programs, such as those run by CMS, states, and private payers.

Figure 1 depicts the basic concept for Capture/Record and Export. The primary purpose of this step is to verify the EHR technology’s ability to export data in the proper QRDA Category I format with the proper Quality Data Model (QDM) data elements.

To verify this capability, Cypress produces static patient data for each of the eCQMs that are to be tested, and exports the relevant patients. This data is entered into the EHR. The EHR is then commanded to export the patient test data as a set of QRDA Category I files that contain the proper elements from the QDM for calculating the eCQMs under test. These QRDA files are loaded back into Cypress where they are tested for validity—determining valid QRDA Category I Extensible Markup Language (XML) documents—and correctness (i.e., containing only the elements required to calculate the eCQMs).



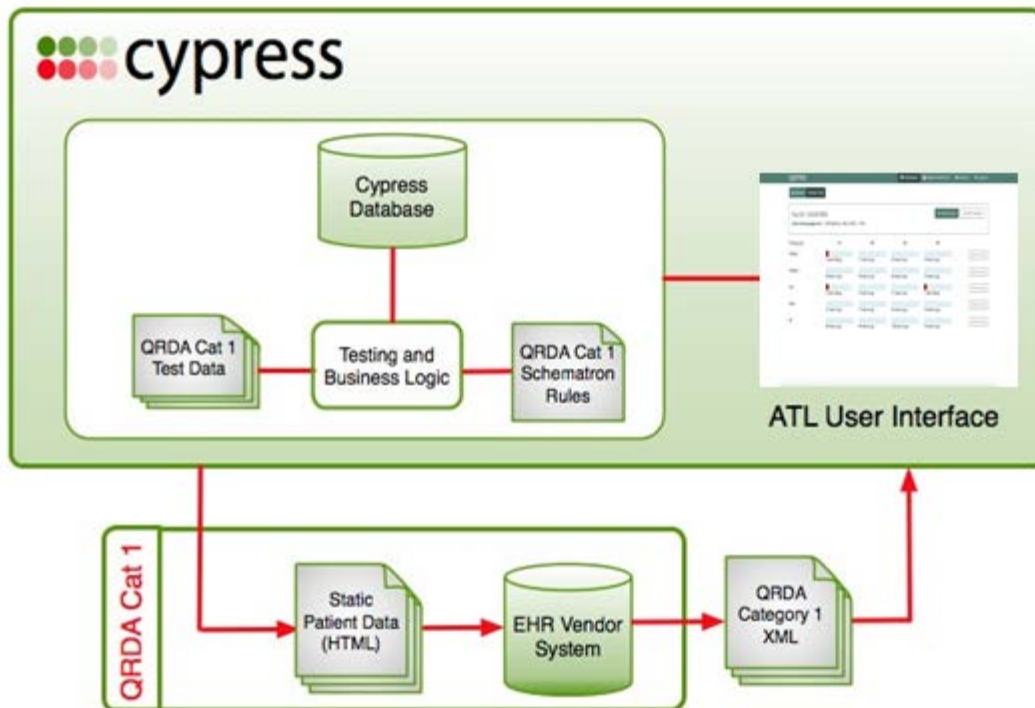


Figure 1. Capture/Record and Export

## 2.2 Import and Calculate

Cypress v3.0 supports the requirements for Import and Calculate capabilities as follows:

- **Import** – EHR technology must be able to electronically import a data file formatted in the QRDA Category I format.
- **Calculate** – EHR technology must be able to electronically calculate each and every clinical quality measure for which it is presented for certification.

A Health IT Module must be capable of demonstrating that it can import data to warrant certification against this criterion using the QRDA Category I IG, even if the module is also certified to provide “capture/record and export” and “report” functions.<sup>1</sup> The requirement ensures that users of certified health IT can import eCQM data formatted to the QRDA Category I standard for one or more patients without needing to request developer support.

<sup>1</sup> From Federal Regulation (80 FR 62650-62651): “First, this functionality could streamline the testing and certification process by importing QRDA Category I files rather than systems needing to manually enter test patient data. Second, the import functionality can promote quality improvement and data sharing between systems by providing systems the ability to import CQM data from other systems in a standardized format.”

## 2.3 Electronic Submission

Cypress v3.0 supports the requirements for Electronic Submission capabilities as follows:

- Electronic Submission enables a user to electronically create a data file in QRDA Category III format for transmission of clinical quality measurement data that can be electronically accepted by CMS.

The criterion for certification of Electronic Submission capabilities supports eCQM reporting using the consensus, industry-based QRDA Category I Release 3 and QRDA Category III Release 1 IGs. It also supports better alignment with the reporting requirements of CMS programs. The CMS reporting requirements (e.g., use of the CMS QRDA IG) are included as an optional provision within the criterion because not all certified health IT is intended for CMS reporting. The certification to the HL7 QRDA Category I and III standards provide a baseline for interoperability of eCQM data because these standards are consensus based and industry developed. Moreover, the program-agnostic HL7 QRDA standards can support a number of use cases for exchanging eCQM data.

Figure 2 shows the basic concept for Import, Calculate, and Electronic Submission. These steps provide for automated verification that an EHR system can:

- Import and calculate the eCQM results for the quality measures being certified based on the synthetic patient data that Cypress presents to the EHR system under test
- Generate a properly formatted summary eCQM report that could be electronically submitted using QRDA Category III format

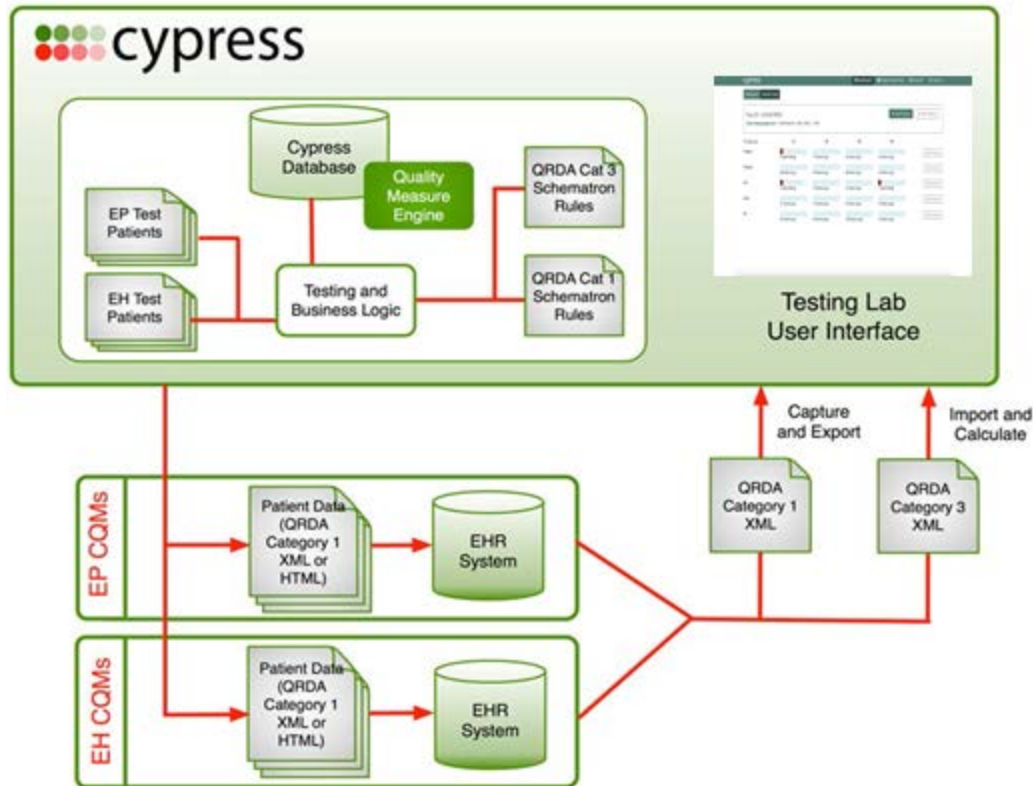


Figure 2. Import, Calculate, and Electronic Submission

## 2.4 Data Filtering

Cypress v3.0 supports the requirements for Data Filtering capabilities as follows:

- EHR technology must be able to record data (according to specified standards, where applicable) and filter eCQM results at both patient and aggregate levels.<sup>2</sup>

Filtering individual patient-level and aggregate-level eCQM results by data supports administrative reporting as well as identification of health disparities and gaps in care for patients treated at particular group practice sites or in a given Accountable Care Organization (ACO).

<sup>2</sup> Rule Reference: 2015 Edition Health Information Technology (Health IT) Certification Criteria, Base Electronic Health Record (EHR) Definition, and ONC Health IT Certification Program Modifications Final Rule (The “2015 Edition”): “The filter functionality included in this criterion will allow a provider to make a query for eCQM results using one or a combination of data captured by the certified health IT for quality improvement and quality reporting purposes. It can also aid in the identification of health disparities, enable care quality improvement, and support providers in delivering more effective care to their patient populations. These filters include, but are not limited to, practice site address, patient age, patient sex, and patient problem list.”

### 3. Detailed Description of Cypress Workflow

Figure 3 illustrates the general workflow of a test performed with the Cypress open source software tool and a description of how the test procedure is organized and conducted. The augmentation of the test procedure to include Cypress is based on the ONC-approved and the National Institute of Standards and Technology (NIST)-published procedure for testing the accurate calculation, submission, and degree of correctness of eCQMs.

As shown in Figure 3, the vendor interacts with the vendor system. An ATL test proctor interacts with the Cypress web interface. The test proctor downloads test data from Cypress, which is then sent from Cypress and entered into the vendor system. The vendor returns test results to Cypress, which generates reports reflecting assessment of certification testing.

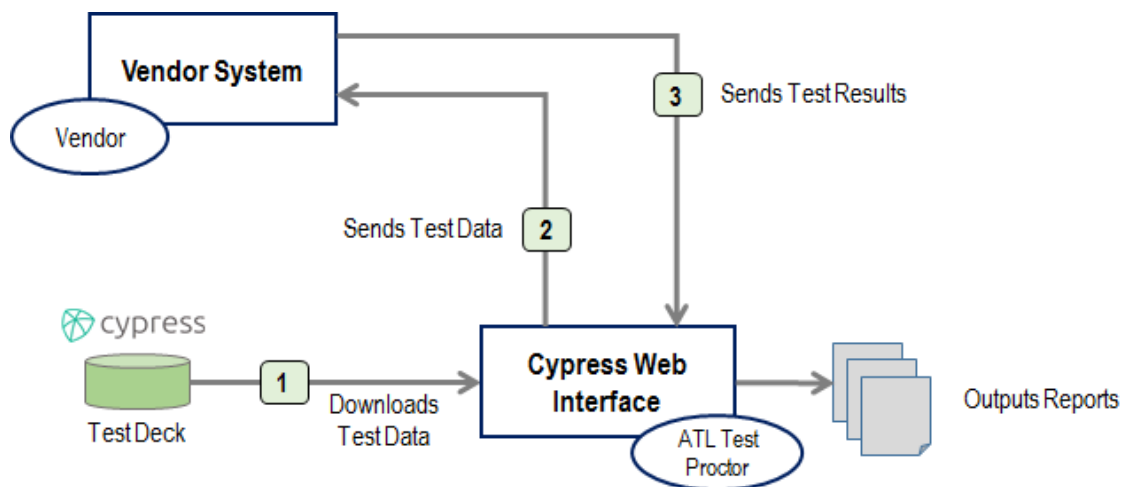


Figure 3. Cypress Workflow in an Authorized Testing Lab

Cypress is capable of performing the following types of tests in support of eCQM certification:

1. XML Data conformance testing of the QRDA Category I standard for individual patient-level data used for eCQM calculation
2. XML Data conformance testing of the QRDA Category III standard for aggregate reporting of eCQM calculation
3. Accuracy calculation testing of the Meaningful Use Stage 2 Eligible Professional (EP) eCQMs
4. Accuracy calculation testing of the Meaningful Use Stage 2 Eligible Hospital (EH) eCQMs

The Cypress website provides a complete description of the Cypress Testing Procedure (available at <http://healthit.gov/cypress/resources.html>).

The following subsections present a detailed description of Cypress v3.0, from Accessing Cypress, overview of administrative functions, preparation for testing, test execution, exit success criteria, and submission to verification.

### 3.1 Accessing Cypress

To access and download the Cypress Software, go to [Project Cypress](#):

- The Project Cypress site provides several options and detailed instructions for downloading and installing the Cypress software. If the software has not been installed, please follow the Cypress Download Instructions. This User Guide does not provide instructions for downloading the Cypress software.

Once Cypress is downloaded and installed, it is accessible via a URL, bookmark, or icon you created as part of the download/installation process.

Once you access your installed instance of Cypress, the Sign In screen should appear. Figure 4 presents a screenshot of the “Sign Up” screen. To create an account, select **Sign up**.

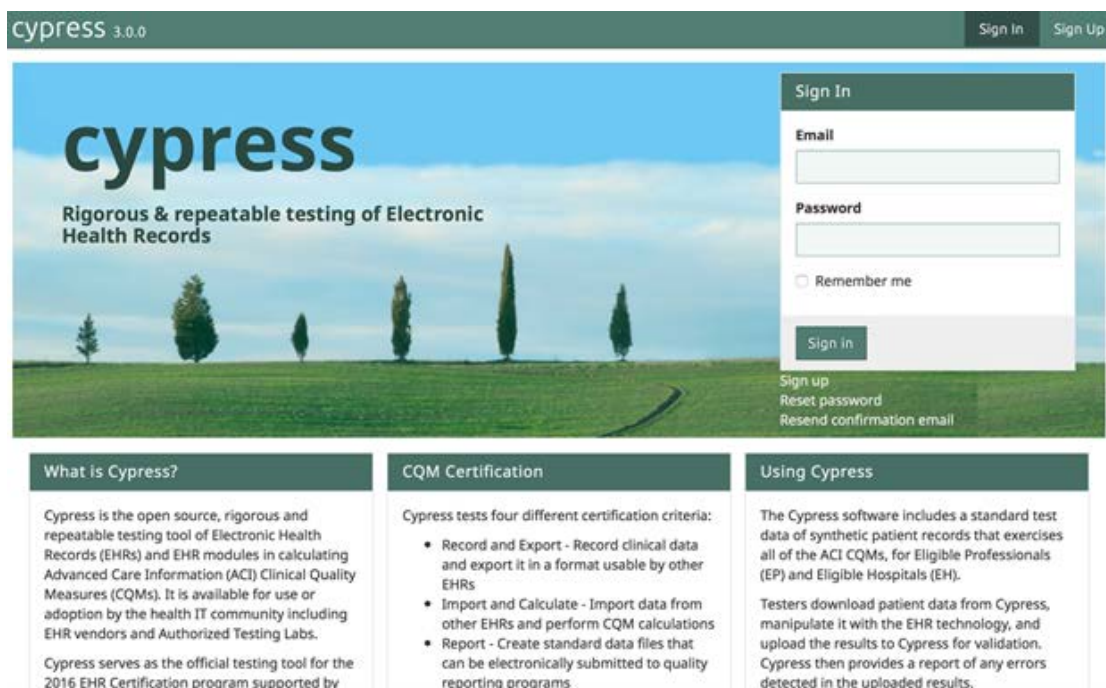


Figure 4. Cypress Sign In Page

- If you have previously set up an account, enter your email and password, and select **Sign In**.
- If you have previously created an account and forgotten your password, enter your email and select **Forgot your Password?** You will be sent a link to reset your password.
- **Sign up** will bring you to the Sign Up and Terms and Conditions page. Click on the Terms and Conditions Link on that page. Figure 5 presents a screenshot of the Sign Up and Terms and Conditions page.

**Terms and Conditions for use of Cypress**

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Back

Figure 5. Cypress Terms and Conditions Page

- To **Sign up**, enter your Email, a Password, and then confirm that Password.
- Read the Terms and Conditions, check **I agree to the above Terms and Conditions**, and select **Sign up** to create your Cypress Account as shown in the screenshot of the Cypress Account creation page (Figure 6).

**Sign Up**

**Email**

**Password**

*8 characters minimum and include at least 3 of the following: lowercase letters, uppercase letters, digits, and special characters.*

**Confirm Password**

Terms and Conditions

I agree to the above Terms and Conditions

**Sign up**

Sign in  
Resend confirmation email

Figure 6. Cypress Account Creation

## 3.2 Overview of Administrative Functions

Cypress displays the **Dashboard** after you create your account, as shown in Figure 7.

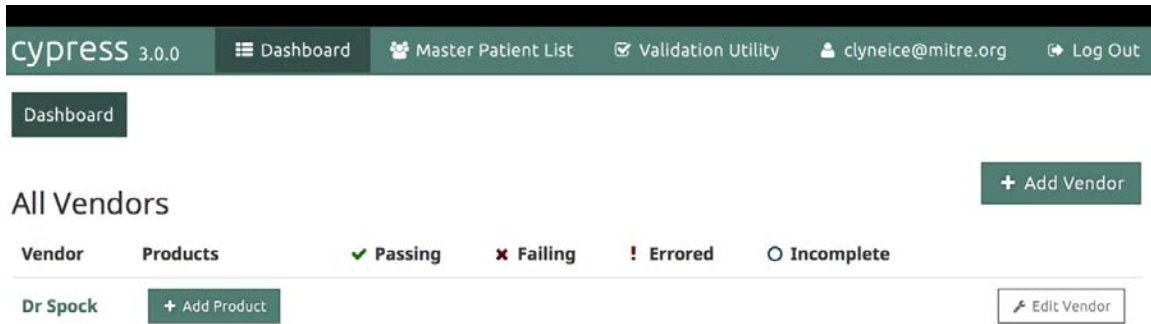


Figure 7. Cypress Dashboard

The Dashboard includes the following Cypress Administrative Functions:

1. Master Patient List – Provide a list of all test data for eCQMs
2. Account – Update a Cypress Account Password
3. Log Out – Log out of the Cypress Application
4. Add Vendor – Enter EHR Vendor contact and product information (please refer to “Cypress v3.0 Preparation for Testing”, subsection 4.3)
5. Edit EHR Vendor – Edit EHR Vendor contact and product information (please refer to “Cypress v3.0 Preparation for Testing”, subsection 4.3)

### 3.2.1 Master Patient List

Figure 8 presents the Master Patient List page that provides a list of all test data for 2016 eCQMs for the 2017 Reporting Period.

## Master Patient List

## Master Patient List

## Filter Patients

Type to search by measure

Type the name or CMS ID of a measure

## Annual Update Bundle

 2015 Bundle for the 2016 Reporting Period 2016 Bundle for the 2017 Reporting Period

## All Patients

Patient Name	DOB	Gender
1 N Adult DM	June 7, 1956	Female
1 N BH Adult	January 21, 1980	Male
1 N BH Infant	May 16, 2015	Male
1 N CA Male	January 22, 1947	Male
1 N ED	October 11, 2001	Female
1 N Eye	January 9, 1957	Male
1 N GP Peds	September 21, 2013	Male

Figure 8. Master Patient List of Test Patients

By selecting the **Filter by Measure** drop-down, you can select a specific measure from a list of patient records that apply to a specific eCQM and eCQM qualifiers. Figure 9 presents an example screenshot of filtering by the measure, CMS2v6 Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan Patients.



Master Patient List

Master Patient List

Filter Patients

Type to search by measure

cms2

Annual Update Bundle

2015 Bundle for the 2016 Reporting Period

2016 Bundle for the 2017 Reporting Period

CMS2v6 Preventive Care and Screening: Screening for Depression and Follow-Up Plan Patients - Logic Coverage 86%

Patient Name	DOB	Gender						
BH_Adult N A	January 1, 1973	Male	○	○	○	○	○	○
Cancer_Adult_Female A	September 1, 1960	Female	○	○	○	○	○	○
Cancer_Adult_Male A	August 1, 1950	Male	○	○	○	○	○	○
Diabetes_Adult A	February 1, 1985	Female	○	○	○	○	○	○
GP_Adult A	February 1, 1963	Female	○	○	○	○	○	○
GP_Geriatric A	January 3, 1948	Male	○	○	○	○	○	○
GP_Peds A	February 1, 1998	Female	○	○	○	○	○	○
Heart_Adult A	February 1, 1945	Male	○	○	○	○	○	○
HIV_Peds A	October 31, 2000	Female	○	○	○	○	○	○
Pregnancy_Adult A	December 1, 1991	Female	○	○	○	○	○	○
BH_Adult B	February 1, 1993	Male	○	○	○	○	○	○
Cancer_Adult_Female B	September 1, 1960	Female	○	○	○	○	○	○
Cancer_Adult_Male B	August 1, 1950	Male	○	○	○	○	○	○
Diabetes_Adult B	February 1, 1985	Female	○	○	○	○	○	○

Figure 9. Patients Specific to CMS2v5 Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan Patients

If you click on the patient’s name in the patient record list, Cypress will display an individual patient record and their eCQM qualifiers as shown in Figure 10.

Master Patient List Patient: Cancer\_Adult\_Female A

Patient Information for Cancer\_Adult\_Female A

Measure Information	IPP	DENOM	NUMER	DENEX	DENEXCEP
CMS2v6 Preventive Care and ...	○	○	○	○	○
CMS22v5 Preventive Care an...	○	○	○	○	○
CMS61v6 (a) Preventive Care ...	○	○	○	○	○
CMS61v6 (b) Preventive Care ...	○	○	○	○	○
CMS61v6 (c) Preventive Care ...	○	○	○	○	○
CMS64v6 (a) Preventive Care ...	○	○	○	○	○
CMS64v6 (b) Preventive Care ...	○	○	○	○	○
CMS64v6 (c) Preventive Care ...	○	○	○	○	○
CMS68v6 Documentation of C...	④	④	○	○	○
CMS69v5 Preventive Care an...	○	○	○	○	○
CMS124v5 Cervical Cancer Sc...	○	○	○	○	○
CMS125v5 Breast Cancer Scre...	○	○	○	○	○
CMS130v5 Colorectal Cancer ...	○	○	○	○	○
CMS138v5 Preventive Care an...	○	○	○	○	○
CMS140v5 Breast Cancer: Hor...	○	○	○	○	○
CMS147v6 Preventive Care an...	○	○	○	○	○

Patient Details

DOB: September 1, 1960  
 Gender: Female  
 Race: American Indian or Alaska Native  
 Ethnicity: Not Hispanic or Latino

Allergies

Care Goals

Conditions

Diagnosis: Breast Cancer  
 ICD-9-CM: 174.0  
 ICD-10-CM: C50.019  
 SNOMED-CT: 188147009  
 Start Time: March 2, 2015 2:30pm

Diagnosis: Breast Cancer Er Or Pr Positive  
 SNOMED-CT: 417742002  
 Start Time: March 2, 2015 2:45pm

Diagnosis: Unilateral Mastectomy, Unspecified Laterality  
 SNOMED-CT: 22964006  
 ICD-9-CM: V45.71  
 ICD-10-CM: Z90.10  
 Start Time: April 28, 2015 1:00pm  
 Anatomical Locati...: Left  
 SNOMED-CT: 419161000

Encounters

Encounter, Performed: Office Visit  
 CPT: 99203

Figure 10. Patient Test Record Data Requirements and eCQM Qualifiers

### 3.2.2 Account

If you have previously set up an account, this function allows you to change your Password or delete your account. Figure 11 presents a screenshot of the account password update and delete page.

The screenshot shows the Cypress user interface. At the top, there is a navigation bar with the Cypress logo and menu items: Dashboard, Master Patient List, Account, and Log Out. Below the navigation bar, there is a dark green header with the text "Edit Account". Underneath, there is a section titled "Edit User" with a dark green header. This section contains four input fields: "Email" (with the value "rlhghapn@sharklasers.com"), "Password", "New Password", and "Confirm New Password". Below the "New Password" field, there is a note: "leave blank if you don't want to change it". At the bottom of the "Edit User" section, there are two buttons: "Update" and "Back". Below the "Edit User" section, there is a red header with the text "Delete Account". Underneath, there is a warning message: "Once you delete your account you cannot get it back. Be sure you want to do this." and a "Delete Account" button.

Figure 11. Account Password Update

### 3.2.3 Log Out

Figure 12 presents a screenshot of the Log Out function that allows a user to return to the Account Sign in (as shown in Figure 4).

The screenshot shows the Cypress v3.0 dashboard. At the top, there is a navigation bar with the Cypress logo and version number "3.0.0", and menu items: Dashboard, Master Patient List, Validation Utility, clyneice@mitre.org, and Log Out. The "Log Out" button is circled in red. Below the navigation bar, there is a dark green header with the text "Dashboard". Underneath, there is a section titled "All Vendors" with a dark green header. This section contains a table with columns: Vendor, Products, Passing, Failing, Errored, and Incomplete. The "Passing" column has a green checkmark, "Failing" has a red X, "Errored" has a red exclamation mark, and "Incomplete" has a blue circle. Below the table, there is a row with the vendor "Dr Spock" and a "+ Add Product" button. To the right of the table, there is a "+ Add Vendor" button and an "Edit Vendor" button.

Figure 12. Cypress v3.0 Log Out

### 3.2.4 Add Vendor

This function allows the user to enter EHR vendor contact and product information (as described in subsection 3.3, Cypress v3.0 Preparation for Testing) as shown in Figure 13.

Figure 13. Add Vendor Page

### 3.2.5 Edit Vendor

This function allows a user to edit EHR Vendor contact and product information (as described in subsection 3.3, Cypress v3.0 Preparation for Testing) as shown in Figure 14.

Figure 14. Edit Vendor Page

### 3.3 Cypress v3.0 Preparation for Testing

#### Add Vendor Information

- Once you have created an account, you can begin testing by adding a Vendor and Contact Information.
- Select **Add Vendor** from the Dashboard as shown in Figure 15.



Figure 15. Dashboard Select Add Vendor

- After selecting **Add Vendor**, the **Create Vendor** information will be displayed as shown in Figure 16.
- Complete the fields listed under Create Vendor and select **Create Vendor**.

The screenshot shows the 'Create Vendor' page in Cypress. The page has a header with 'cypress' and navigation links for 'Dashboard', 'Master Patient List', 'Account', and 'Log Out'. Below the header, there is a 'Dashboard' tab and an 'Add Vendor' tab. The main content area is titled 'Create Vendor' and contains several input fields: 'Vendor Name' (Dr Spock7), 'Vendor ID' (Dpock1234567), 'URL' (www.valdemar.org), 'Address' (3432 enterprise way), 'State' (DC), and 'Zip' (20010). There are also fields for 'POC Name' (earliness smith 7), 'Email' (es7@valdemar.org), 'Telephone' (5713420027), and 'Type of Contact' (emp). A 'Remove' button is next to the 'Type of Contact' field. At the bottom, there is an 'Add Point of Contact' button and a 'Create Vendor' button circled in red, along with a 'Cancel' button.

Figure 16. Create Vendor Page

#### Enter Product Information

- The next step is to enter Product Information. Begin by clicking the Vendor name displayed on the Dashboard as shown in Figure 17.

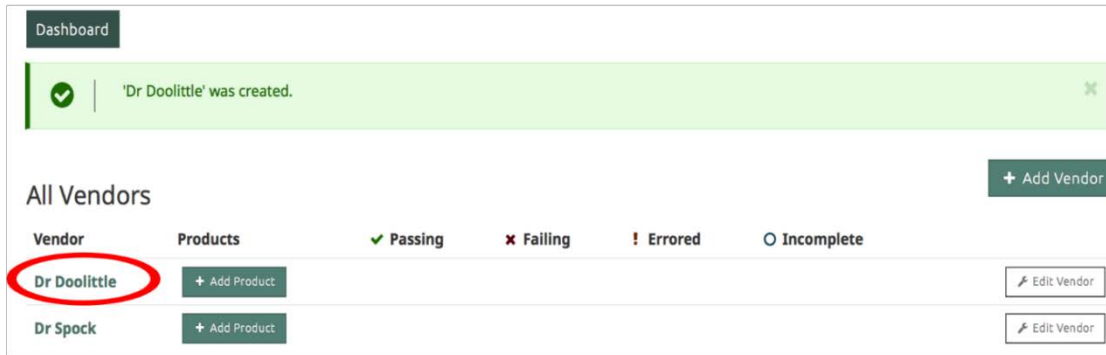


Figure 17. Dashboard with New Vendor Created

- Next, click **Add Product**, as shown in Figure 18, to begin entering vendor product information.

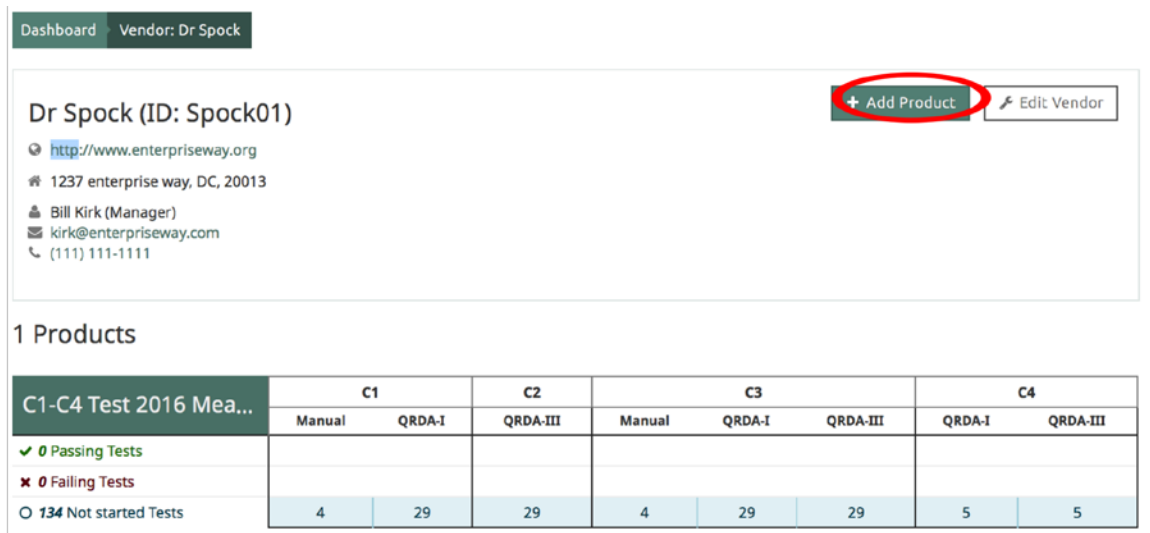


Figure 18. Vendor Product Information Page

- On the **Add Product** page, presented in Figure 19:
  - Enter Product information (Name, Version, and Description). Examples would be: product version number, the name and version of any optional modules installed in the product at the time of the test, and the operating system.
  - For Certification Types, you must certify (that is, check the box) to at least C1 or C2 (a product must certify to either C1 or C2) from the following options:
    - ◆ C1 Test – Record and Export
    - ◆ C2 Test – Import and Calculate
    - ◆ C3 Test – Data Submission
    - ◆ C4 Test – Data Filtering

- For Records Options, note that Randomize Records and Duplicate Records have already been pre-checked because these options are recommended for the most robust testing (although they can be unselected, if needed)
- For Annual Update Bundle, you must select which bundle of eCQMs you are certifying for:
  - ◆ 2016 Bundle for 2017 Reporting Period
  - ◆ 2015 Bundle for 2016 Reporting Period

Figure 19. Vendor Add Product Page

- The Vendor Add Product page also has a section entitled “Measures Options” that must be completed before adding a product.
- For Measures Options, you must indicate the clinical quality measures (i.e., select one option) Cypress should use to certify this product, as shown in Figure 20. The options are:
  - Eligible Hospital eCQMs
  - Eligible Provider eCQMs
  - All eCQMs
  - Custom. Selecting “Custom” allows you to specify any individual measures Cypress should use to certify this product. Figure 21 presents a screenshot of the option for “Custom”.

Dashboard Vendor: Dr Doolittle Add Product

**Add Product**

**Name**

**Version**

**Description**

**Certification Types**

C1 Test

C2 Test

C3 Test

C4 Test

*A product must at least certify to C1 or C2.*

**Records Options**

Randomize Records

Duplicate Records

*Recommended for most robust testing.*

**Annual Update Bundle**

2015 Bundle for the 2016 Reporting Period 2015.0.0

2016 Bundle for the 2017 Reporting Period 2016.0.0

*Select the measure versions Cypress should use to certify this product.*

**Measures Options**

Eligible Hospital eQMs

Eligible Professional eQMs

All eQMs

Custom...

*Indicate the clinical quality measures Cypress should use to certify this product. Testing will be performed on a measure-by-measure basis. Click 'Custom' to specify individual measures.*

Figure 20. Eligible Hospital eQMs Measure Selection

Dashboard Vendor: Dr Doolittle Add Product

**Add Product**

**Name**

**Version**

**Description**

**Certification Types**

C1 Test

C2 Test

C3 Test

C4 Test

*A product must at least certify to C1 or C2.*

**Records Options**

Randomize Records

Duplicate Records

*Recommended for most robust testing.*

**Annual Update Bundle**

2015 Bundle for the 2016 Reporting Period 2015.0.0

2016 Bundle for the 2017 Reporting Period 2016.0.0

*Select the measure versions Cypress should use to certify this product.*

**Measures Options**

Eligible Hospital eQMs

Eligible Professional eQMs

All eQMs

Custom...

*Indicate the clinical quality measures Cypress should use to certify this product. Testing will be performed on a measure-by-measure basis. Click 'Custom' to specify individual measures.*

Figure 21. Vendor Add Product, "Custom" Measures Option

- Please note that testing will be performed on a measure-by-measure basis.
- Once all of the information has been entered on the Vendor Add Product page, select **Add Product**, as shown in Figure 22.

A product must at least certify to C1 or C2.

Select Custom Measures 4 Clear all

**Acute Myocardial Infarction (4 EH)** 4 ✓

- Asthma (1 EH)
- Behavioral Health Adult (7 EP)
- Behavioral Health General (1 EP)
- Behavioral Health Pediatric (1 EP)
- Cancer (4 EP)
- Community Acquired Pneumonia (1 EH)
- Core (17 EP)
- Dental (1 EP)
- Diabetes (7 EP)
- Emergency Department (3 EH)
- Eye (4 EP)
- General Practice Adult (9 EP)
- General Practice Pediatric (1 EP)
- HIV (3 EP)
- Heart (6 EP)
- Newborn (3 EH)
- Orthopedics (2 EP)
- Pregnancy (1 EP, 1 EH)
- Stroke (7 EH)
- Surgical Care Improvement Project (3 EH)
- Venous Thromboembolism (6 EH)

Select all 4 Acute Myocardial Infarction measures

- CMS30v6 Statin Prescribed at Discharge (EH)
- CMS53v5 Primary PCI Received Within 90 Minutes of Hospital Arrival (EH)
- CMS60v5 Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival (EH)
- CMS100v5 Aspirin Prescribed at Discharge (EH)

Add Product
Cancel

Figure 22. Vendor Add Product page, Select "Add Product"

- The Vendor and Product will now display on the Dashboard.
- Select the product name under Products to begin defining tests for the product as shown in Figure 23.

Dashboard Vendor: Dr Doolittle

**Dr Doolittle (ID: Doolittle1234)** + Add Product Edit Vendor

🌐 <http://www.doolittle.org>

📍 1233 Doolittle way, DC, 20010

2 Products

C1-4 Professional 2015	C1		C2	C3			C4	
	Manual	QRDA-I	QRDA-III	Manual	QRDA-I	QRDA-III	QRDA-I	QRDA-III
✓ 0 Passing Tests								
✗ 2 Failing Tests		1			1			
○ 272 Not started Tests	4	63	64	4	63	64	5	5

C1-4 Hospital	C1		C2	C3			C4	
	Manual	QRDA-I	QRDA-III	Manual	QRDA-I	QRDA-III	QRDA-I	QRDA-III
✓ 1 Passing Tests					1			
✗ 5 Failing Tests		3			2			
○ 128 Not started Tests	4	26	29	4	26	29	5	5

Figure 23. Dashboard Displaying a Vendor with Two Products Added



## 3.4 Test Execution

### Background

This process evaluates the capability of the EHR system under test (SUT) to electronically generate the proper eCQM artifacts for the eCQMs being certified.

The Test Proctor provides the Cypress v3.0 Test Data for the clinical quality measures for which the EHR system will be tested in the format selected by the EHR vendor.

Depending on the test, the vendor manually inputs or electronically downloads the patient test data from Cypress that is used to test their EHR system.

- To manually enter data for C1 certification for a substantial number of measures, the vendor can select only C1 certification for Eligible Professional, Eligible Hospital, or custom measures from the Product Page. This selection will generate a deterministic subset of measure attributes for each measure exported from your EHR system. Cypress checks the attributes for correctness, and a zip file of exported patients in XML format is uploaded into Cypress for C1 certification.
- Selecting C1 certification along with C2, C3, and C4 will provide the vendor with the following certification test options that allow a Test Proctor to examine the eCQMs implemented in their EHR:
  - C1-C3 Manual tests, which will have only four predetermined measures for manual testing of C1 and C3 certifications. This tab validates the EHR system for C1 and C3 certifications by manually entering specified patient data for four measures. Certifiers will download a QRDA zip file of patients, which is uploaded into their EHR system and re-uploaded into Cypress.
  - C1-C3 (QRDA-I), which will contain measures (based on your selection of all eCQMs or Custom for either hospitals or professionals). This tab will test the EHR system's ability to record and export (C1) and submit (C3) measure-based data.
  - C2-C3 (QRDA-III), which tests the EHR system's ability to import and calculate (C2) and submit (C3) measure-based data. Certifiers will submit XML patient files exported from their EHR system to verify calculation and submission of reporting.
  - C4 (QRDA-I and QRDA-III), which test the EHR system's ability to filter patient records.

This process enables you to test the product based on the Certification Types and Measures Options you selected when you created the product.

### 3.4.1 Automated Measure Test Execution

Certifiers who will provide their test measures for C1 testing by uploading their measures rather than manually entering them will select C1 as well as a C2, C3, or C4 certification type test. Figure 24 shows C1 and C2 certification selected for all hospital eCQMs with randomized and duplicate records to be included in the test data files created by Cypress. Products certifying to C2 criteria in addition to C1 will create a product that has a limited number of C1 manual test measures, automated C1 manual measures, and any other certification tests created.

Dashboard Vendor: Dr Doolittle Add Product

**Add Product**

**Name**  
C1-C2 Certification Hospitals

**Version**  
[Empty field]

**Description**  
[Empty field]

**Certification Types**

- C1 Test
- C2 Test
- C3 Test
- C4 Test

*A product must at least certify to C1 or C2.*

**Records Options**

- Randomize Records
- Duplicate Records

*Recommended for most robust testing.*

**Annual Update Bundle**

- 2015 Bundle for the 2016 Reporting Period 2015.0.0
- 2016 Bundle for the 2017 Reporting Period 2016.0.0

*Select the measure versions Cypress should use to certify this product.*

**Measures Options**

- Eligible Hospital eCQMs
- Eligible Professional eCQMs
- All eCQMs
- Custom...

*Indicate the clinical quality measures Cypress should use to certify this product. Testing will be performed on a measure-by-measure basis. Click 'Custom' to specify individual measures.*

Add Product Cancel

Figure 24. C1-C2 Automated Entry Certification

Figure 25 shows the result of adding the C1-C2 certification.

Dashboard Vendor: Dr Doolittle

✓ 'C1-C2 Certification Hospitals' was created.

Dr Doolittle (ID: Doolittle01) + Add Product Edit Vendor

🌐 <http://www.Doolittle.org>  
📍 1234 Doolittle way, DC, 21111

5 Products

C1-C2 Certification H...	C1		C2	C3 Manual	C3 QRDA-I	C3 QRDA-III	C4 QRDA-I	C4 QRDA-III
	Manual	QRDA-I	QRDA-III					
✓ 0 Passing Tests								
✗ 0 Failing Tests								
○ 62 Not started Tests	4	29	29					

Figure 25. Add Product for Automated Entry of Measure Data

To select a measure for testing, click on the product name shown in Figure 26.

Dashboard Vendor: Dr Doolittle

✓ 'C1-C2 Certification Hospitals' was created.

Dr Doolittle (ID: Doolittle01) [+ Add Product](#) [Edit Vendor](#)

http://www.Doolittle.org  
1234 Doolittle way, DC, 21111

5 Products

	C1		C2	C3	C4
	Manual	QRDA-I	QRDA-III		
✓ 0 Passing Tests					
✗ 0 Failing Tests					
○ 62 Not started Tests	4	29	29		

Figure 26. Selecting A Product to Test

Figure 27 shows the certification tests created for C1-C2 Hospital measures. Note the tab for manual entry that contains only four measures as well as tabs for C1 all Hospital and C2 certifications. The first Manual Entry Test validates the EHR system for C1 certification by manually entering specified patient data for those identified measures. The second tab, C1 (QRDA-I), tests the EHR system's ability to record and export (C1), while the third tab, C2 (QRDA-III) tests the EHR system's ability to import and calculate (C2). Two sections appear, side by side, toward the top of the page: Product Status (on the user's left) and Download Full Test Deck. The Product Status section provides for each Certification Type (based on the Measures Options you selected) a quick summary of the test cases that have passed, failed, and not yet started. On the right side of the page is a section entitled Download Full Test Deck. This download contains a folder for each measure selected for this product. These folders contain XML documents for each patient associated with that measure.

	C1		C2	C3	C4
	Manual	QRDA-I	QRDA-III		
✓ 0 Passing Tests					
✗ 0 Failing Tests					
○ 62 Not started Tests	4	29	29		

**Download Full Test Deck**

This download contains a folder for each measure selected for this product. Inside these folders are XML documents for each patient associated with that measure.

[Download All Patients \(.zip\)](#)

**C1 Manual** C1 (QRDA-I) C2 (QRDA-III)

Validate the EHR system for C1 certification by manually entering specified patient data for the following measures.

[View Manual Entry](#)

Manual Entry Test	Status
CMS108v5 Venous Thromboembolism Prophylaxis	Not Started
CMS171v6 Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision	Not Started
CMS178v6 Urinary catheter removed on Postoperative Day 1 (POD 1) or Postoperative Day 2 (POD 2) with day of surgery being day zero	Not Started
CMS188v6 Initial Antibiotic Selection for Community-Acquired Pneumonia (CAP) in Immunocompetent Patients	Not Started

**Upload Results**

**C1 Upload Results** **Status**

○ Not Started ○ Not Started ○ Not Started

Figure 27. Showing C1 Manual, C1 Automated, and C2 Product Measures

To execute a Test for C1 (QRDA-1), select that tab and select the desired measure to begin testing, using either the Upload Link (if you already have your zip file ready for upload), or click on the Measure Name to download a test file to upload for C1 Certification testing as shown in Figure 28. The upload button will display a file selection dialogue box to select your file. The Measure Name Link will take you to the screen shown in Figure 29.

Test the EHR system's ability to record and export (C1) measure based data.

CMS ID	Measure Name	C1 Results	Quick Upload	Last Updated
CMS9v5	Exclusive Breast Milk Feeding	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS26v4	Home Management Plan of Care (HMPC) Document Given to Patient/Caregiver	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS30v6	Statin Prescribed at Discharge	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS31v5	Hearing Screening Prior To Hospital Discharge	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS32v6	Median Time from ED Arrival to ED Departure for Discharged ED Patients	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS53v5	Primary PCI Received Within 90 Minutes of Hospital Arrival	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS55v5	Median Time from ED Arrival to ED Departure for Admitted ED Patients	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago
CMS60v5	Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival	<input type="radio"/> Not Started	<input type="button" value="upload"/>	⌚ 20 minutes ago

Figure 28. Product Measure Upload or Measure Name Selection

Once you have selected the Measure Name you want to test, Cypress displays the test page for that individual measure (e.g., CMS9v5) as shown in Figure 29.

**Measure Test Information**

**Measure:** Exclusive Breast Milk Feeding  
**HQMF ID:** 40280381-52FC-3A32-0153-1F236F640EC7  
**CMS ID:** CMS9v5

**Provider Name:** Morris, Maxine  
**Provider NPI:** 1520048897  
**Provider TIN:** 419658703

[View Patients](#)  
[Get Known Good Result](#)

**C1**

QRDA Errors --  
Reporting Errors --  
Execution Date --

**C2**

QRDA Errors --  
Reporting Errors --  
Execution Date --

start

**1** Download Test Deck

Download and import this data into your EHR clinical quality measure calculator.

**2** Upload Files

Upload results from the EHR system in the form of a zip file of QRDA Category I documents to get test results. This will automatically run a test execution.

Figure 29. Individual Measure Test Page

- Patient test data for the selected eCQMs of the specified test must be downloaded in the format required for the test.
- Click the **Download QRDA Category I (.zip)** button to download the test data for that selected eCQM. The downloaded zip file will contain duplicate and randomized patient records that your EHR system should correct for the uploaded portion of the test. The downloaded patient record test data will be contained in a zip file. Figure 30 shows an example filename entry.



Figure 30. Zip File of Patient Test Data for Selected eQOM

- If you click the **View Patients** link (shown in Figure 29), you will see a listing of the patients for that specific measure.
- Click **Get Known Good Results** link to download a zip file of patients that will pass the measure test you are planning to conduct as shown in Figure 31.

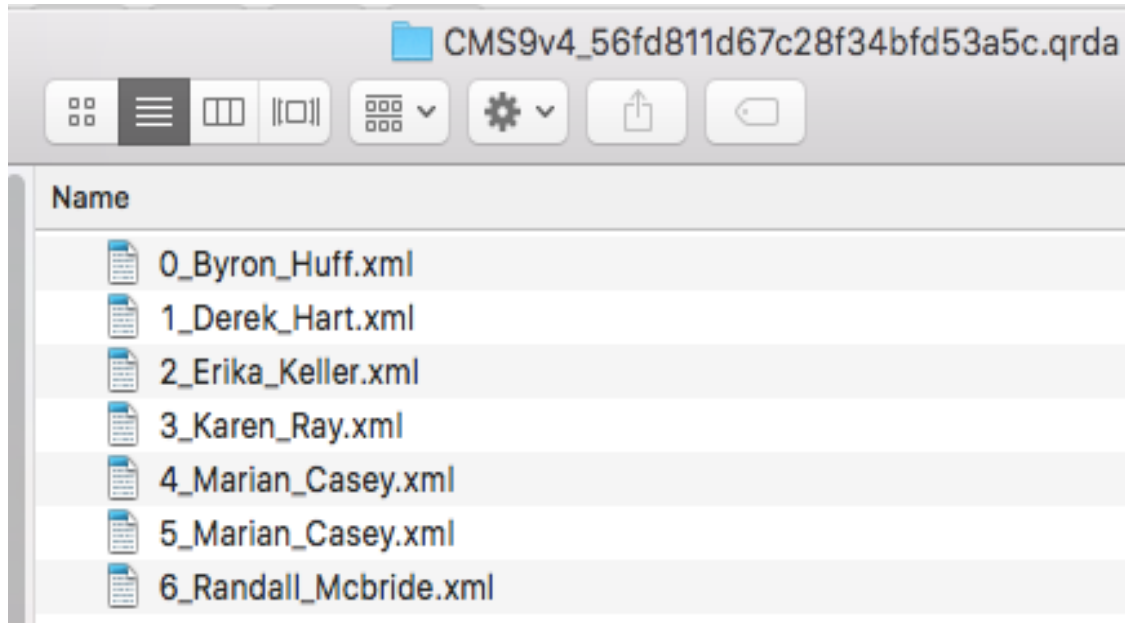


Figure 31. Listing of Zip File of XML Patient Test Data for Testing Selected eQOM

- Select a single patient record and open the XML from the zip file listing to view the information. Figure 32 presents an example screenshot.

```

CMS117v4_5717fd667c28f4ffe43875a.debug Reporting period changed mood and class code/xml
<?xml version="1.0" encoding="utf-8"?>
<ClinicalDocument xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="urn:h17-org:v3"
  xmlns:cda="urn:h17-org:v3">
  <!--
  *****
  CDA Header
  *****
  -->
  <realmCode code="US"/>
  <typeId root="2.16.840.1.113883.1.3" extension="POCD_HD00040"/>
  <!-- QRDA Category III Release 1 template ID (this template ID differs from QRDA III comment only
  template ID). -->
  <templateId root="2.16.840.1.113883.10.20.27.1.1"/>
  <id root='23440020-ff41-0133-b3b7-00505601057e' extension="CypressExtension"/>

  <!-- SHALL QRDA III document type code -->
  <code code="55184-6" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC"
    displayName="Quality Reporting Document Architecture Calculated Summary Report"/>
  <!-- SHALL Title, SHOULD have this content -->
  <title>QRDA Calculated Summary Report</title>
  <!-- SHALL -->
  <effectiveTime value="20160518161144"/>
  <confidentialityCode codeSystem="2.16.840.1.113883.5.25" code="N"/>
  <languageCode code="en"/>
  <!-- SHOULD The version of the file being submitted. -->
  <versionNumber value="1"/>
  <!-- SHALL contain recordTarget and ID - but ID is nulled to NA. This is an aggregate summary report.
  Therefore CDA's required patient identifier is nulled. -->
  <recordTarget>
    <patientRole>
      <id nullFlavor="NA"/>
    </patientRole>
  </recordTarget>

  <!-- SHALL have 1..* author. MAY be device or person.
  The author of the CDA document in this example is a device at a data submission vendor/registry. -->
  <author>
    <time value="20160518161144"/>
    <assignedAuthor>

```

Figure 32. Patient XML File for C2 Test

- Once the EHR system has generated the test results in the QRDA Category I format, the results are uploaded from that individual measure's test page under the Upload files section. For C2 and C3 testing, this upload would occur in QRDA Category III format.
- Click on **Select file** as shown in Figure 33, browse to the QRDA Category I file you want to upload, and click **Choose**.

Measure Test Information	C1	C2
<b>Measure:</b> Exclusive Breast Milk Feeding <b>HQMF ID:</b> 40280381-52FC-3A32-0153-1F236F640EC7 <b>CMS ID:</b> CMS9v5  <b>Provider Name:</b> Morris, Maxine <b>Provider NPI:</b> 1520048897 <b>Provider TIN:</b> 419658703  <a href="#">View Patients</a> <a href="#">Get Known Good Result</a>	QRDA Errors -- Reporting Errors -- Execution Date --	QRDA Errors -- Reporting Errors -- Execution Date --  start
1  Download Test Deck  Download and import this data into your EHR clinical quality measure calculator.  <input type="button" value="Download QRDA Category I (.zip)"/>	2  Upload Files  Upload results from the EHR system in the form of a zip file of QRDA Category I documents to get test results. This will automatically run a test execution.  <input type="text"/> <input type="button" value="Select file"/>	

Figure 33. Upload Test Execution Results

- The Test Proctor will then validate that the proper eCQM artifacts in QRDA Category I file format for the test being performed are electronically generated by the EHR SUT.
- Validation results will then be displayed in the Dashboard for that specific vendor's product as shown in Figure 34.

## 2 Products

C1-4 Professional 2015	C1		C2	C3			C4	
	Manual	QRDA-I	QRDA-III	Manual	QRDA-I	QRDA-III	QRDA-I	QRDA-III
✓ 0 Passing Tests								
✗ 2 Failing Tests		1			1			
○ 272 Not started Tests	4	63	64	4	63	64	5	5

C1-4 Hospital	C1		C2	C3			C4	
	Manual	QRDA-I	QRDA-III	Manual	QRDA-I	QRDA-III	QRDA-I	QRDA-III
✓ 1 Passing Tests					1			
✗ 5 Failing Tests		3			2			
○ 128 Not started Tests	4	26	29	4	26	29	5	5

Figure 34. Example of Test Execution Summary Results

## 3.4.2 Manual Entry Test (Extensive C1 Manual Testing Only)

To begin manual entry testing (and validate the EHR system for C1 certification by manually entering specified patient data for specific measures), select the Manual Entry Test tab and then select **View Test** as shown in Figure 35.

**Manual Entry Test**

Validate the EHR system for C1 certification by manually entering specified patient data for the following measures.

**Test Status** [View Test](#)

Manual Entry Test	Status
CMS53v5 Primary PCI Received Within 90 Minutes of Hospital Arrival	Failing
CMS60v5 Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival	Failing
CMS69v5 Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up Plan	Failing
CMS131v5 Diabetes: Eye Exam	Failing
CMS133v5 Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery	Failing
CMS144v5 Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)	Failing
CMS145v5 Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)	Failing
CMS149v5 Dementia: Cognitive Assessment	Failing

Upload Results	C1 Upload Results	Status
<a href="#">View Results</a>	In Progress	In Progress

Figure 35. Manual Entry Test, Select "View Test"

As shown in Figure 36, this action will bring you to the Manual Entry Checklist test page, which displays the status of each test on the right margin (i.e., Not Started, Passing, or Failing). The Manual Entry Checklist page also displays a summary of each test, and allows the user to check off (and save) a test when it has been completed.

3 View Results					
<b>Manual Entry Test</b>					<b>Status</b>
CMS53v5 Primary PCI Received Within 90 Minutes of Hospital Arrival					<b>Failing</b>
CMS60v5 Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival					<b>Failing</b>
CMS69v5 Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up Plan					<b>Failing</b>
CMS131v5 Diabetes: Eye Exam					<b>Failing</b>
CMS133v5 Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery					<b>Failing</b>
CMS144v5 Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)					<b>Failing</b>
CMS145v5 Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)					<b>Failing</b>
CMS149v5 Dementia: Cognitive Assessment					<b>Failing</b>
<b>Upload Results</b>		<b>C1 Upload Results</b>		<b>Status</b>	
View Results		<b>In Progress</b>		<b>In Progress</b>	

CMS53v5 Primary PCI Received Within 90 Minutes of Hospital Arrival					
Validated in QRDA	Data Criteria	Section	Required Attributes	Value Set(s)	Recorded Code/Attribute Value
	Encounter, Performed	<b>Valuesets</b>		Encounter Inpatient: 2.16.840.1.113883.3.666.5.307	✓ <b>Code</b> 183452005
		<b>Attributes</b>	Length of stay	stay ≤ 120 d	✓ <b>Recorded result</b> 9 days
		<b>Attributes</b>	Transfer from	Transfer From: 2.16.840.1.113883.3.666.5.687	✓ <b>Attribute code</b> 10531005
	Medication, Administered	<b>Valuesets</b>		Fibrinolytic Therapy: 2.16.840.1.113883.3.666.5.736	✓ <b>Code</b> 313212

Figure 36. Manual Entry Checklist Page

Completing and saving a test, as shown in Figure 37, will then refresh the page and provide an updated status description for that specific test.



CMS53v5 Primary PCI Received Within 90 Minutes of Hospital Arrival					
Validated in QRDA	Data Criteria	Section	Required Attributes	Value Set(s)	Recorded Code/Attribute Value
	Encounter, Performed	Valuesets		Encounter Inpatient: 2.16.840.1.113883.3.666.5.307	<input checked="" type="checkbox"/> <b>Code</b> <input type="text" value="183452005"/>
		Attributes	Length of stay	stay ≤ 120 d	<input checked="" type="checkbox"/> <b>Recorded result</b> <input type="text" value="9 days"/>
	Diagnostic Study, Performed	Attributes	Transfer from	Transfer From: 2.16.840.1.113883.3.666.5.687	<input checked="" type="checkbox"/> <b>Attribute code</b> <input type="text" value="10531005"/>
		Valuesets			Electrocardiogram (ECG): 2.16.840.1.113883.3.666.5.735
	Procedure, Performed	Attributes	Result	Acute or Evolving MI: 2.16.840.1.113883.3.666.5.3022	<input checked="" type="checkbox"/> <b>Attribute code</b> <input type="text"/>
		Valuesets			Aortic balloon pump insertion: 2.16.840.1.113883.3.666.5.1151  Endotracheal Intubation: 2.16.840.1.113762.1.4.1045.69  Ventricular Assist Device placement: 2.16.840.1.113883.3.666.5.3015  PCI: 2.16.840.1.113762.1.4.1045.67
	Patient Characteristic Race	Valuesets		Race: 2.16.840.1.114222.4.11.836	<input checked="" type="checkbox"/> <b>Code</b> <input type="text" value="2028-9"/>
		Attributes			
<input checked="" type="button" value="Save"/> This saves the entire checklist page					

Figure 37. Complete and Save a Test

When all of your manual test measure entries are correct and have a completed checkmark, the select button will be enabled to allow upload of your XML files (zipped into a single file) into Cypress for certification as shown in Figure 38.

**C1**

## Manual Entry Checklist

[Download Criteria List](#)

**1 Checklist Instructions**

- Fill in the Data Criteria Checklist below.
  - If a Data Criteria has value sets listed, an appropriate code needs to be entered into the "Recorded Code" text box.
  - If an Attribute has a value set, an appropriate code needs to be entered into the "Recorded Attribute Code" text box.
  - Codes are validated upon saving.
  - Result, Date Times, Cumulative Medication Durations, Fulfills, and Length of Stay are to be recorded as free text. ATLS will record the values they have observed being entered into the system under test.
- Create (at least) one patient for each measure below.
  - The created patients must contain all required Data Criteria, for the selected measures, to pass certification.
  - Export the created patients as QRDA Category I, and create a zip file.
- Upload zip file with created test patients.

**2 Upload Files**

Complete the checklist before you upload results from your EHR system.

[Select file](#)

Figure 38. Select File to Upload

### 3.4.3 CQM Filtering Test

The filter functionality included in this criterion allows a provider to query for eCQM results using one or a combination of data captured by the certified health IT for quality improvement and quality reporting purposes. It can also help identify health disparities, enable care quality improvement, and support providers in delivering more effective care to their patient populations. This certification criterion requires that a Health IT Module be capable of recording data (according to specified standards, where applicable) and filtering eCQM results at both patient and aggregate levels. These filters include, but are not limited to, practice site address, patient age, patient sex, and patient problem list.

- To begin eCQM filtering testing, click the C4 (QRDA-I and QRDA-III) Filtering Test tab, and click **start** on whichever Category I or Category III you are interested in testing as shown in Figure 39.

C1 + C3 Manual   C1 + C3 (QRDA-I)   C2 + C3 (QRDA-III)   **C4 (QRDA-I and QRDA-III)**

Test the EHR system's ability to filter patient records.

Filtering Criteria	QRDA Category I	QRDA Category III	Last Updated
Ethnicities/Age	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> Friday at 12:17pm
Genders/Races	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> Friday at 12:17pm
NPI & TIN	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> Friday at 12:17pm
NPI, TIN & Provider Location	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> Friday at 12:17pm
Problems	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> start <input type="button" value="upload"/>	<input type="radio"/> Friday at 12:16pm

Figure 39. Select a Category I or Category III to Test

- In this example, the Category I test page for Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD) will be displayed as shown in Figure 40.

C1 | C2 | C3 | **C4**

### Filtering Test Information

**Measure:** Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)  
**HQMF ID:** 40280381-4B9A-3825-014B-E0C7AC461325  
**CMS ID:** CMS144v4

[View Patients](#)  
[Get Known Good Result](#)

QRDA Category I

**QRDA Errors** --  
**Reporting Errors** --  
**Submission Errors** --  
**Warnings** --  
**Execution Date** --

QRDA Category III

**QRDA Errors** --  
**Reporting Errors** --  
**Submission Errors** --  
**Warnings** --  
**Execution Date** --

start

1 ⚡ Download Test Deck	2 ⚡ Filter Patients	3 ⚡ Upload Files
Download and import this data into your EHR clinical quality measure calculator. <div style="background-color: #004a7c; color: white; padding: 2px; display: inline-block; margin-top: 5px;">             Download QRDA Category I (.zip)           </div>	Remove any patients not meeting the following criteria. <b>Age As Of July 29, 2016</b> Minimum 51 Payers Other	Upload results from the EHR system in the form of a zip file of QRDA Category I documents to get test results. This will automatically run a test execution. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px; display: flex; align-items: center;"> <input style="flex-grow: 1;" type="text"/> <div style="background-color: #004a7c; color: white; padding: 2px 10px; margin-left: 5px;">             Select file           </div> </div>

Figure 40. Category I Test Page for Heart Failure (HF): Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction (LVSD)

- Patient test data for the specified test must be downloaded in the format required for the test. This step, and those following, adhere to the same process as the steps outlined in the *Measure Tests* section, and will not be repeated here.

### 3.5 Test Execution Success Criteria

The criteria to determine a successful test outcome depend on whether the EHR product is being certified against the EP eCQMs or the EH eCQMs. The criteria for test execution success are as follows:

- **For EP eCQMs**, a successful test outcome is one in which the following conditions are true:
  1. There were no XML validation errors in either the QRDA Category I submitted data or the QRDA Category III submitted data.
  2. All of the eCQM results calculated and submitted by the EHR SUT exactly match the values that Cypress v3.0 was expecting.
- **For EH eCQMs**, a successful test outcome is one in which the following conditions are true:
  1. There were no XML validation errors in either the QRDA Category I submitted data or the QRDA Category III submitted data.
  2. All of the eCQM results calculated and submitted by the EHR SUT for discrete measures exactly match the values that Cypress v3.0 was expecting.
  3. The eCQM results calculated and submitted by the EHR SUT for continuous variable tests are within a defined delta of the value that Cypress v3.0 was expecting.

For both types of EHR technologies, it is acceptable to have XML validation *warnings* generated by the Cypress validation process. These warnings do not constitute a test failure; however, the Test Proctor should review the warnings generated and record any relevant observations about the reasons for the warnings.

Cypress groups failed test cases into three categories: (1) QRDA errors associated with logic and improper use of the QRDA standard, (2) reporting errors associated with errors in the calculation and aggregation of measure data for reporting purposes, and (3) submission errors associated with improper logic and formatting for submitting measure data to CMS. In addition to errors, Cypress will flag and report on warnings that indicate non-conformance with the CMS Implementation Guide (and associated schematron validation). The optional C3 certification criteria for CMS requires the test to pass without any warnings from the CMS schematron. These warnings are listed separately from other warnings under the “CMS Warnings” section. Note, for EHRs not certifying for reporting (C3), non-conformance with the HL7 QRDA Implementation Guide will be treated as warnings. Figure 40 provides an example of measure test failure results.

**Measure Test Information**

	C1 and C3	C2 and C3
<b>Measure:</b> Exclusive Breast Milk Feeding	<b>QRDA Errors</b> 0	<b>QRDA Errors</b> --
<b>HQMF ID:</b> 40280381-52FC-3A32-0153-1F236F640EC7	<b>Reporting Errors</b> 4	<b>Reporting Errors</b> --
<b>CMS ID:</b> CMS59v5	<b>Submission Errors</b> 1	<b>Submission Errors</b> --
	<b>Warnings</b> 0	<b>Warnings</b> --
	<b>Execution Date</b> July 29, 2016 4:09pm	<b>Execution Date</b> --

**Provider Name:** Wright, Jay  
**Provider NPI:** 1997463082  
**Provider TIN:** 547218028

View Patients  
Get Known Good Result

**1 Download Test Deck** | **2 Upload Files**

Download and import this data into your EHR clinical quality measure calculator.  
[Download QRDA Category I \(.zip\)](#)

Upload results from the EHR system in the form of a zip file of QRDA Category I documents to get test results. This will automatically run a test execution.  
 [Select file](#)

**Results** Most Recent - July 29, 2016 4:09pm (5 errors) [Refresh View](#)

**Failed with 5 errors**

**Missing or Duplicate Files**  
 ✘ Records for patients HOLLY WATKINS, BONNIE LOVE, GREGORY FRANKLIN not found in archive as expected

**Errors and Warnings**

- ✘ 0\_4\_N Newborn.xml (1) **0\_4\_N Newborn.xml - 1 errors and warnings**
- ✘ 1\_NEWBORN\_A.xml (1)
- ✘ 2\_NEWBORN\_B.xml (1)

[View Uploaded XML with Errors](#)

QRDA (0) | **Reporting (1)** | Submission (0) | Warnings (0)

**Error message** [Go To in XML](#)

Patient name '4 N NEWBORN' declared in file not found in test records

Figure 41. Measure Test Failure Messages

## 3.6 Submit

### Electronically Submit Generated eQOM Artifacts

This functionality allows evaluation of the capability to electronically submit (a) calculated quality measures in accordance with the standard and implementation specifications, and (b) exported patient data sufficient to allow external calculation as follows:

- The Test Proctor commands the EHR SUT to generate and electronically submit the patient-level export in the QRDA Category I format for the clinical quality measures being tested.
- The Test Proctor commands the EHR SUT to generate and electronically submit an aggregate report in the QRDA Category III format of the clinical quality measures calculated in the test.
- The Test Proctor validates that the calculated clinical quality measures are submitted in accordance with the QRDA Category III standard and implementation specifications by uploading the QRDA Category III XML via the Cypress v3.0 User Interface and the Cypress-supplied XML Schema validation.
- The Test Proctor validates that the exported patient-level eQOM data are submitted in accordance with the QRDA Category I standard and implementation specifications by uploading the QRDA Category I XML via the Cypress v3.0 User Interface and the Cypress-supplied XML Schema validation.

## 3.7 Verify

### Verify Electronic and Accurate Generation of Clinical Quality Measure Artifacts

This functionality allows evaluation of the capability to electronically and accurately generate eQOM artifacts appropriate for each phase of the test procedure as follows:

- After the Test Proctor validates the submission of the QRDA Category III, the Test Proctor evaluates and displays the accuracy of the submitted clinical quality measure results via the Cypress v3.0 User Interface.
- The Test Proctor generates a test artifact bundle containing all test data used for this test execution, all products generated and submitted by the EHR SUT, and any other additional notes or information that the Test Proctor deems relevant into a single archive file that is cryptographically signed.

## Acronyms

<b>ACO</b>	Accountable Care Organization
<b>ATL</b>	Authorized Testing Lab
<b>CAMH</b>	CMS Alliance to Modernize Healthcare
<b>CMS</b>	Centers for Medicare & Medicaid Services
<b>CQM</b>	Clinical Quality Measure
<b>eCQM</b>	Electronic Clinical Quality Measure
<b>EH</b>	Eligible Hospital
<b>EHR</b>	Electronic Health Record
<b>EP</b>	Eligible Professional
<b>FFRDC</b>	Federally Funded Research and Development Center
<b>HHS</b>	Department of Health and Human Services
<b>HL7</b>	Health Level Seven International
<b>HTML</b>	Hypertext Markup Language
<b>IG</b>	Implementation Guide
<b>NIST</b>	National Institute of Standards and Technology
<b>ONC</b>	Office of the National Coordinator for Health Information Technology
<b>QDM</b>	Quality Data Model
<b>QRDA</b>	Quality Reporting Document Architecture
<b>SUT</b>	System Under Test
<b>XML</b>	Extensible Markup Language