

Tacoma Project



An Open Source Clinical Quality Measure Testing and Certification Tool



August 12, 2015



What is Cypress?

- **Cypress is the rigorous and repeatable testing tool for Electronic Health Records (EHRs) and EHR modules in calculating Meaningful Use (MU) Stage 2 Clinical Quality Measures (CQMs).**
- **Cypress v2 serves as the official testing tool for the 2014 EHR Certification program**
 - Supported by the Office of the National Coordinator for Health IT (ONC).
- **The Cypress tool is open source**
 - Freely available for use or adoption by the health IT community including EHR vendors and testing labs.

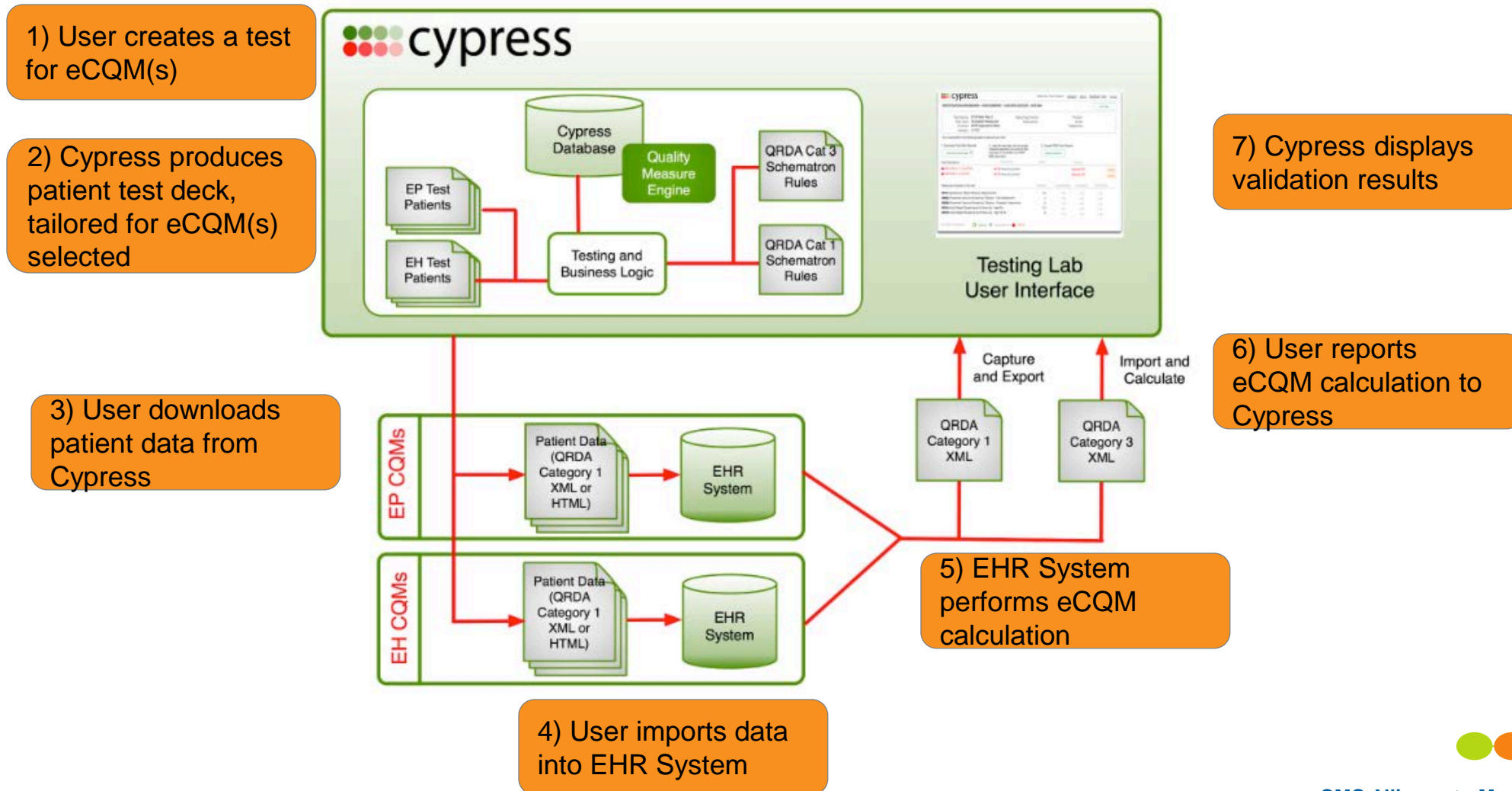


Testing Criteria for MU2

- CQM certification criteria addressed by Cypress include:
 - **Capture and Export (C1)** – the capability of EHR technology to create a data file that can be incorporated by another EHR technology which could be used to calculate CQMs
 - Demonstrates the EHR can produce a valid QRDA I
 - **Import and Calculate (C2)** – the capability of EHR technology to incorporate data (from another EHR technology where necessary) and correctly calculate the result for CQMs
 - Demonstrates the EHR can accurately calculate the eCQMs under test
 - **Electronic Submission (C3)** – the capability of EHR technology to create a standard data file that can be electronically accepted by the Centers for Medicare and Medicaid Services (CMS)
 - Demonstrates the EHR can accurately produce a QRDA III



Concept of Operations



Step 1) – User creates a test

cypress

Version: 2.6.1

Welcome, Dave [account](#) [about](#) [validation utility](#) [feedback](#) [help](#) [logout](#)

CERTIFICATION DASHBOARD » ECQI 101 » TEST PRODUCT

Edit Product

Add Test

Product: Test Product

Description:

Version:

TESTS	TYPE	DESCRIPTION	EXECUTIONS
There are no tests for this product. <div>Add Test</div>			
FAILING TESTS	TYPE	DESCRIPTION	EXECUTIONS
PASSING TESTS	TYPE	DESCRIPTION	EXECUTIONS
INCOMPLETE TESTS	TYPE	DESCRIPTION	EXECUTIONS

Error Report Indicators:

passing

insufficient info

failing

CERTIFICATION DASHBOARD » DSCZ » DEMO PRODUCT » CREATE NEW TEST

Back

Step 1 of 2

Next

Describe the test...

* Test Name: CMS68

Measurement Period: from 01/01/2013 to 12/31/2013

Bundle Version: Meaningful Use Stage 2 Quality Bundle - 2.6.0

Description:

Test Type:

Outpatient - to test quality measures for Eligible Professionals (EP)

Inpatient - to test quality measures for Eligible Hospitals (EH)

Identify **at least one** quality measure to test from the list of available measures for this product...

Behavioral Health Adult

Behavioral Health General

Behavioral Health Pediatric

Cancer

Core 1

Dental

Diabetes

Eye

General Practice Adult

General Practice Pediatric

HIV

Heart

Orthopedics

Pregnancy

☐ all quality measures

☐ all Core measures

☐ CMS155v3/0024 - Weight Assessment and Counseling for Nutrition and Physical Activity for Children and Adolescents

☐ CMS50v3/ClosingReferralLoop - Closing the Referral Loop: Receipt of Specialist Report

☐ CMS126v3/0036 - Use of Appropriate Medications for Asthma

☐ CMS166v4/0052 - Use of Imaging Studies for Low Back Pain

☐ CMS153v3/0033 - Chlamydia Screening for Women

☐ CMS156v3/0022 - Use of High-Risk Medications in the Elderly

☐ CMS90v4/FSACHF - Functional Status Assessment for Complex Chronic Conditions

☐ CMS136v4/0108 - ADHD: Follow-Up Care for Children Prescribed Attention-Deficit/Hyperactivity Disorder (ADHD) Medication

☐ CMS75v3/ChildDentalDecay - Children Who Have Dental Decay or Cavities

☐ CMS69v3/0421 - Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up Plan

☐ CMS117v3/0038 - Childhood Immunization Status

☒ CMS68v4/0419 - Documentation of Current Medications in the Medical Record

☐ CMS2v4/0418 - Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan

☐ CMS138v3/0028 - Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention

☐ CMS146v3/0002 - Appropriate Testing for Children with Pharyngitis

☐ CMS165v3/0018 - Controlling High Blood Pressure

☐ CMS154v3/0069 - Appropriate Treatment for Children with Upper Respiratory Infection (URI)



eCQMs available with Cypress

■ Eligible Professional (64)

- Behavioral Health (9)
- Cancer (4)
- Core (17)
- Dental (1)
- Diabetes (7)
- Eye (4)
- General Practice (10)
- HIV (3)
- Heart (6)
- Orthopedics (2)
- Pregnancy (1)

■ Eligible Hospital (29)

- Acute Myocardial Infarction (4)
- Asthma (1)
- Community Acquired Pneumonia (1)
- Emergency Department (3)
- Newborn (3)
- Pregnancy (1)
- Stroke (7)
- Surgical Care Improvement Project (3)
- Venous Thromboembolism (6)



Sample Clinical Quality Measure

eMeasure Title	Documentation of Current Medications in the Medical Record		
eMeasure Identifier (Measure Authoring Tool)	68	eMeasure Version number	4
NQF Number	0419	GUID	9a032d9c-3d9b-11e1-8634-00237d5bf174
Measurement Period	January 1, 20xx through December 31, 20xx		
Measure Steward	Centers for Medicare & Medicaid Services		
Measure Developer	Quality Insights of Pennsylvania		
Endorsed By	National Quality Forum		
Description	Percentage of visits for patients aged 18 years and older for which the eligible professional attests to documenting a list of current medications using all immediate resources available on the date of the encounter. This list must include ALL known prescriptions, over-the-counters, herbals, and vitamin/mineral/dietary (nutritional) supplements AND must contain the medications' name, dosage, frequency and route of administration. < >		

Population criteria

- **Initial Patient Population =**
 - AND: "Patient Characteristic Birthdate: birth date" >= 18 year(s) starts before start of "Measurement Period"
 - AND: "Occurrence A of Encounter, Performed: Medications Encounter Code Set" during "Measurement Period"
- **Denominator =**
 - AND: "Initial Patient Population"
- **Denominator Exclusions =**
 - None
- **Numerator =**
 - AND: "Procedure, Performed: Current Medications Documented SNMD" during "Occurrence A of Encounter, Performed: Medications Encounter Code Set"
- **Denominator Exceptions =**
 - AND: "Procedure, Performed not done: Medical or Other reason not done" for "Current Medications Documented SNMD " during "Occurrence A of Encounter, Performed: Medications Encounter Code Set"

2) Cypress produces Patient Test Deck for selected measures

- Patient deck is generated from a list of patients applicable to the measures being tested
- All test patients are derivatives of the patients found in the Master Patient List
 - Patient names and dates are randomized for each test generated

CERTIFICATION DASHBOARD » ECQI 101 » TEST PRODUCT » CMS68 Master Patient List

Test Name: CMS68 Measurement Period: 01/01/2013 - 12/31/2013 Proctor: Dave Czulada
Test Type: EP Description: Email: dczulada@mitre.org
Product: Test Product EHR Vendor: eCQI 101 Telephone:
Version:

CMS / NQF #
Core
CMS68v4 0419 -

Quality Measure: **Documentation of Current Medications in the Medical Record**
Percentage of visits for patients aged 18 years and older for which the eligible professional attests to documenting a list of current medications using all immediate resources available on the date of the encounter. This list must include ALL known prescriptions, over-the-counters, herbals, and vitamin/mineral/dietary (nutritional) supplements AND must contain the medications' name, dosage, frequency and route of administration.

Measure Status: ● Pass

Reporting Statistics:

	Population	Denominator	Den. Exclusions	Numerator	Num. Exclusions	Exceptions
reported/expected	- / 15	- / 15	/	- / 1	/	- / 0

POP	DEM	NUM	EXCL	EXCPT	OUT	LAST NAME	FIRST NAME	DOB	GENDER
●	●	○	○	○	●	Byrd	Leo	02/01/1942	M
●	●	○	○	○	●	Cannon	Elsie	01/29/1968	F
●	●	○	○	○	●	Douglas	Bradley	01/06/1992	M
●	●	○	○	○	●	Gordon	Leona	02/01/1968	F
●	●	○	○	○	●	Phelps	Erin	01/09/1938	F
●	●	○	○	○	●	Tucker	Vicki	08/23/1963	F
●	●	○	○	○	●	Walton	Oscar	02/01/1943	M
●	●	○	○	○	●	Wells	Jeffrey	01/01/1971	M

Name	Original
Byrd ,Leo	B ,Eye_Adult
Cannon ,Elsie	A ,GP_Adult
Douglas ,Bradley	D ,BH_Adult
Gordon ,Leona	B ,GP_Adult
Phelps ,Erin	C ,GP_Adult
Tucker ,Vicki	B ,Cancer_Adult_Female
Walton ,Oscar	A ,Heart_Adult
Wells ,Jeffrey	A ,BH_Adult

For CMS68 – Cypress
randomly selected patients
with a medications
encounter



Cypress Patient Test Records

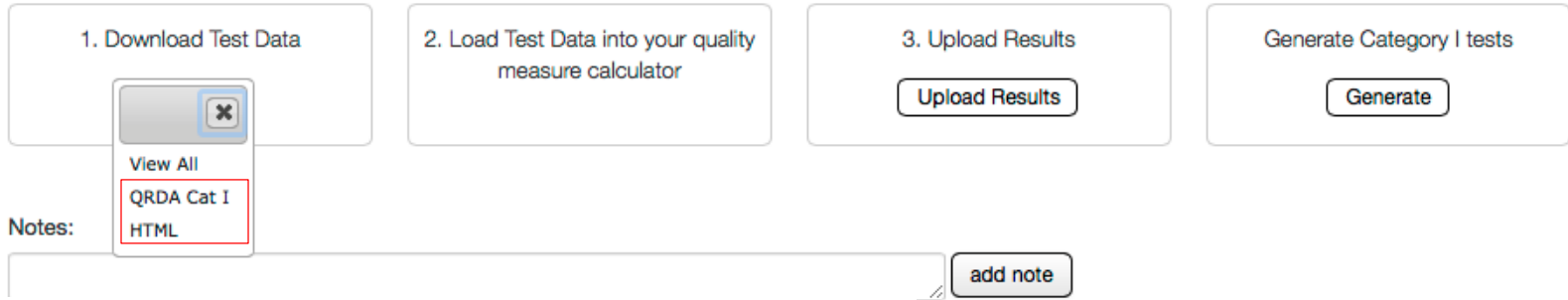
- **The Cypress patient test data consists of:**
 - 36 synthetic patients designed for the 64 CQMs selected for Stage 2 of Meaningful Use for Eligible Professionals (EPs).
 - 20 synthetic patients designed for the 29 CQMs selected for Eligible Hospital (EH) and Critical Access Hospitals (CAH).



3) User downloads patient data from Cypress

■ Patient data can be downloaded as HTML or XML (QRDA Cat I)

You must perform the following steps to execute your test:



Cypress Certification Patient Test Record: Margaret Clarke

Patient	Margaret Clarke	Sex	Female
Date of birth	February 6th, 1968 17:22	Date of expiration	
Race	Black or African American	Ethnicity	Not Hispanic or Latino
Insurance Providers	Other	Patient IDs	54d3976f69702d0db6b60200 Cypress
Contact info			
Document Id	54d3976f69702d0db6b60200 2.16.840.1.113883.3.72		
Document Created:	February 5th, 2015 16:17		
Author	Auto Generated		
Contact info	Tel: +1-781-271-3000		
Document maintained by	Cypress		
Contact info	202 Burlington Rd. Bedford, MA 01730 Tel: +1-781-271-3000		

Encounters

Description	Codes	Time	Status	Results	Fields
Encounter, Performed	CPT: 99201	April 4th, 2013 16:22 - April 4th, 2013 17:22	performed		
Encounter, Performed	CPT: 99201	June 30th, 2013 16:22 - June 30th, 2013 17:22	performed		

Procedures

Description	Codes	Time	Status	Results	Fields
Procedure, Performed	SNOMED-CT: 428191000124101	April 4th, 2013 16:37 - April 4th, 2013	performed		

Documentation of current medications (procedure)

```
<?xml version="1.0" encoding="utf-8"?>
<?xml-stylesheet type="text/xsl" href="cdc.xsl"?>
<!-- Initial Document xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:hl7-org:v3"
xmlns:ivoc="urn:hl7-org:ivoc"
xmlns:stc="urn:hl7-org:stc" -->
<!-- QRDA Header -->
<!-- QRDA code="R5"/>
<!-- QRDA root="2.16.840.1.113883.1.3" extension="POCD_H000004"/>
<!-- US Realm Name: Template ID -->
<!-- QRDA root="2.16.840.1.113883.16.26.22.1.1"/>
<!-- QRDA templateId -->
<!-- QRDA root="2.16.840.1.113883.16.26.24.1.1"/>
<!-- QRDA templateId -->
<!-- QRDA root="2.16.840.1.113883.16.26.24.1.1"/>
<!-- This is the quality measure identifier for this QRDA document -->
<!-- QRDA root="20018313-ef72-432c-9909-61530416fac"/>
<!-- QRDA document type code -->
<!-- QRDA code="S182-M" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Quality Measure Report"/>
<!-- This is the document creation time -->
<!-- effectiveTime value="201304181633"/>
<!-- confidentialityCode code="W" codeSystem="2.16.840.1.113883.5.25"/>
<!-- languageCode code="eng"/>
<!-- reported patient -->
<!-- recordTarget -->
<!-- patient -->
<!-- ID root="Cypress" extension="515F723054fa39A000070" -->
<!-- Fake Medicare ID number -->
<!-- extension="1234" root="2.16.840.1.113883.4.572"/>
<!-- code use="ipm" -->
<!-- streetAddressLine=282 Burlington Rd.</streetAddressLine>
<!-- city=Bedford</city>
<!-- state=MA</state>
<!-- postalCode=01730</postalCode>
<!-- country=US</country>
<!-- add -->
<!-- phone use="WP" value="tel:+1-781-271-3000"/>
<!-- Optional -->
<!-- name -->
<!-- nameFamily -->
<!-- nameGiven -->
<!-- nameSuffix -->
<!-- administrativeGenderCode code="M" codeSystem="2.16.840.1.113883.5.1" codeSystemName="HL7 AdministrativeGender"/>
<!-- birthTime value="19680106180000"/>
<!-- raceCode code="1002-5" displayName="American Indian or Alaska Native" codeSystemName="CDC Race and Ethnicity" codeSystem="2.16.840.1.113883.6.238"/>
<!-- ethnicityCode code="2136-5" displayName="Hispanic or Latino" codeSystemName="CDC Race and Ethnicity" codeSystem="2.16.840.1.113883.6.238"/>
<!-- languageCommunication -->
<!-- language root="2.16.840.1.113883.3.88.11.83.2" assigningAuthorityName="HL7SP/CIS"/>
<!-- templateId root="1.3.6.1.4.1.19376.1.5.3.1.2.1" assigningAuthorityName="IME/PCC"/>
<!-- languageCode code="eng"/>
<!-- languageCommunication -->
<!-- patient -->
<!-- patientId -->
<!-- recordTarget -->
<!-- Example of an author who is a device -->
```



4) User import data into EHR System

5) EHR System performs eCQM calculation

- Steps not shown in live demo
- Steps are described in the “Test Procedure for §170.314(c)(1) – (c)(3) Clinical quality measures”
- Can be found on Healthit.gov
 - <http://www.healthit.gov/policy-researchers-implementers/2014-edition-final-test-method>

2014 Edition
Test Procedure for §170.314(c)(1) – (c)(3) Clinical quality measures
Approved Test Procedure Version 1.12 ■ July 23, 2015

The Office of the National Coordinator for
Health Information Technology

Test Procedure for §170.314(c) Clinical quality measures

This document describes the test procedure for evaluating conformance of complete EHRs or EHR modules to the certification criteria defined in 45 CFR Part 170 Subpart C of the Health Information Technology: Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, 2014 Edition; Revisions to the Permanent Certification Program for Health Information Technology, Final Rule. The document¹ is organized by test procedure and derived test requirements with traceability to the normative certification criteria as described in the Overview document located at <http://www.healthit.gov/certification> (navigation: 2014 Edition Test Method). The test procedures may be updated to reflect on-going feedback received during the certification activities.

The Department of Health and Human Services (HHS)/Office of the National Coordinator for Health Information Technology (ONC) has defined the standards, implementation guides and certification criteria used in this test procedure. Applicability and interpretation of the standards, implementation guides and certification criteria to EHR technology is determined by ONC. Testing of EHR technology in the Permanent Certification Program, henceforth referred to as the ONC Health Information Technology (HIT) Certification Program², is carried out by National Voluntary Laboratory Accreditation Program (NVLAP)-Accredited Testing Laboratories (ATLs) as set forth in the final rule establishing the Permanent Certification Program (Establishment of the Permanent Certification Program for Health Information Technology, 45 CFR Part 170; February 7, 2011).

Questions or concerns regarding the ONC HIT Certification Program should be directed to ONC at ONC.Certification@hhs.gov.

CERTIFICATION CRITERION

This test plan documents the procedure for testing electronic health record (EHR) technology for the calculation and reporting of Clinical Quality Measure (CQM) results as set forth in the Health Information Technology: Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, 2014 Edition; Revisions to the Permanent Certification Program for Health Information Technology Final Rule (September 4, 2012) issued by the Department of Health and Human Services (HHS). Applicable sections of this rule include:

§170.314(c) Clinical quality measures.

(1) Clinical Quality Measures – capture and export.

¹ Disclaimer: Certain commercial products may be identified in this document. Such identification does not imply recommendation or endorsement by ONC.

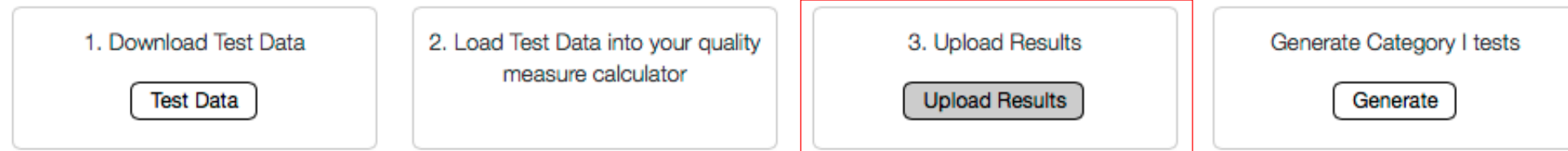
² Health Information Technology: Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, 2014 Edition; Revisions to the Permanent Certification Program for Health Information Technology, Final Rule.

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6) User reports eCQM calculation to Cypress

- EHR generated QRDA Cat I or QRDA Cat III files uploaded into Cypress

You must perform the following steps to execute your test:



- Single file for QRDA Cat III test
- A zip archive for QRDA Cat I test



7) Cypress displays test results

cypress

Version: 2.6.1

Welcome, Dave

[account](#)

[about](#)

[validation utility](#)

[feedback](#)

[help](#)

[logout](#)

CERTIFICATION DASHBOARD

»

ECQI 101

»

TEST PRODUCT

View Test Measures

Edit Test

Test Name: CMS68

Measurement Period: 01/01/2013 - 12/31/2013

Proctor: Dave Czulada

Test Type: EP

Description:

Email: dczulada@mitre.org

Product: Test Product

Version:

Telephone:

Bundle Version: Meaningful Use Stage 2

Quality Bundle - 2.6.0

You must perform the following steps to execute your test:

1. Download Test Data

2. Load Test Data into your quality measure calculator

3. Upload Results

Generate Category 1 tests

Test Data

Upload Results

Generate

Notes:

add note

TEST EXECUTIONS

RESULTS

2015-08-04 19:24:37 UTC

Download Results

Delete

2015-08-04 19:23:38 UTC

Download Results

Delete

2015-08-04 19:20:44 UTC

Download Results

Delete

TEST RESULTS

Summary

Errors

QRDA Errors

Download

Errors

1. CMS68v4/0419 - Documentation of Current Medications in the Medical Record: HQMF_ID: 40280381-4555-E1C1-0145-DC7DC26A44BF

- expected IPP DC87C081-5272-4E9A-B10A-F607FCEB560B value 15 does not match reported value 14
- expected supplemental data for IPP SEX F value [4] does not match reported supplemental data value [3]
- expected supplemental data for DENOM RACE 1002-5 value [5] does not match reported supplemental data value []
- unexpected supplemental data for DENOM RACE 1004-5
- Could not find value for Population DENEXCEP
- supplemental data for DENEXCEP not found expected {"RACE"=>[], "ETHNICITY"=>[], "SEX"=>[], "PAYER"=>[]}

PASSING MEASURES

There are no passing measures for this test

FAILING MEASURES

REPORTED/EXPECTED	INITIAL POPULATION	DEN. DENOMINATOR	EXCLUSIONS	NUMERATOR	EXCEPTIONS
CMS68v4/0419 - Documentation of Current Medications in the Medical Record	14 / 15	15 / 15	/	1 / 1	- / 0

Name

cms68catIII.xml

records

html

Bradley_Douglas.html

Elsie_Cannon.html

Erin_Phelps.html

Jeffrey_Wells.html

Leo_Byrd.html

Leona_Gordon.html

Oscar_Walton.html

Vicki_Tucker.html

json

qrda

test-execution-results.pdf

Test Results can also be downloaded as a zip file



What Does Cypress Validate?

■ QRDA Category I

- Patient zip file
 - Are the correct patients included?
 - Does the zip file have a valid directory structure?
- Individual patient files
 - Is the file conformant to the CDA schema?
 - Is the file conformant with the HL7 QRDA Implementation Guide?
 - Is all relevant smoking gun data included?
 - Is data filtered for the measures under test?
 - Are correct code/value sets being used?

■ QRDA Category III

- Is the file conformant to the CDA schema?
- Is the file conformant with the HL7 QRDA Implementation Guide?
- Are the correct measures/populations being reported?
- Do the reported population values match the expected results?
- Does the reported supplemental information match the expected?
- Is the performance rate calculated correctly?
- Is the measurement period correct?



Available Cypress Versions

Cypress Version	eCQM Version	QRDA Implementation Guide
Cypress 2.7.0	2015 EP + EH	DSTU R3 (2015)
Cypress 2.6.1	2014 EP + EH	DSTU Errata (2014)
Cypress 2.6.0 (90 days following 2.6.1 release)	2014 EP + EH	DSTU Errata (2014)

Bolded versions available for certification



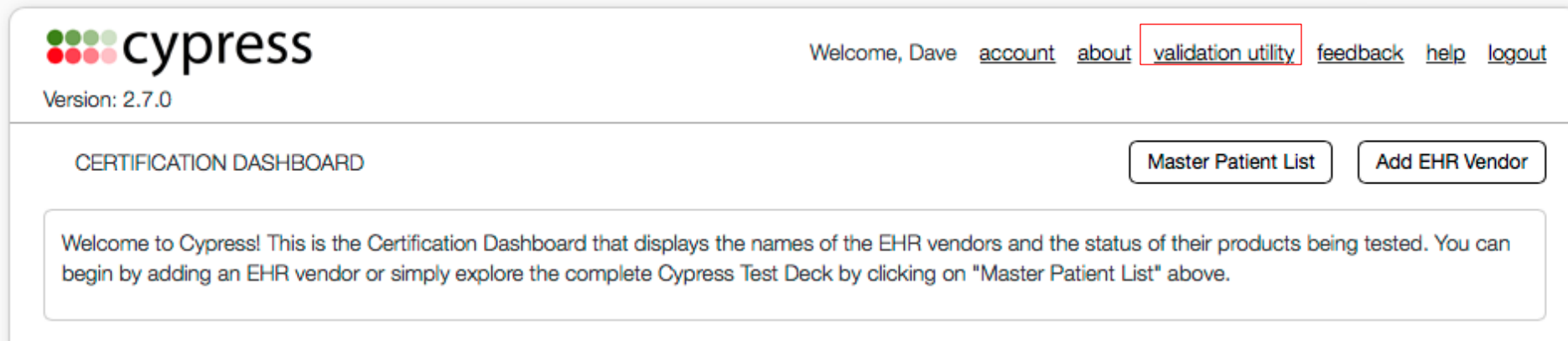
Live Demo of Cypress



Cypress Validation Utility

- A separate and optional utility for testing QRDA conformance against the CMS QRDA Combined Implementation Guides (IGs) for both the 2015 and 2016 specifications.
 - Upon file upload, the utility checks additional QRDA constraints required for CMS submission
 - These constraints are not tested with Cypress Certification
 - Cypress Certification tests compliance to the base QRDA IG.


<https://validator.projectcypress.org>



NOTE: Link always redirects to the public Cypress Validation Utility



Cypress Validation Utility

 cypress validation utility

WARNING: This utility is meant for synthetic patient records only. **DO NOT** upload documents containing Protected Health Information (PHI) or Personally Identifiable Information (PII).

The Cypress QRDA Validation Utility is intended as a development tool for EHR vendors who are testing synthetic QRDA Category I and Category III documents for conformance to CMS submission requirements. Files submitted for validation must not contain PHI or PII.

Document

Select QRDA file

Reporting Program Year

None (Base IG Only)

2015

2016

Reporting Program

PQRS

HQR

Document Type

QRDA Cat I (R2)

QRDA Cat I (R3)

QRDA Cat III

PHI Confirmation

Please check the box to acknowledge that you've read and understand the warning, and to the best of your knowledge, the submitted files will contain neither PII nor PHI: ☐

Submit

This project is sponsored by the Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC) and has been developed by The MITRE Corporation.

[Privacy Policy](#) | [Disclaimer](#)



Live Demo of Cypress Validation Utility



Cypress Resources

- **Web Site**
 - <http://projectcypress.org>
- **Demo Server**
 - <https://demo.projectcypress.org>
 - <https://validator.projectcypress.org>
- **Questions/Feedback**
 - talk@projectcypress.org
- **Cypress Tech Talks hosted biweekly on Tuesdays @ 1:00 PM (Next on 8/18)**
 - Register at <https://attendee.gotowebinar.com/register/4320153072701235201>



Questions

