eCQM 101 Overview

- What is an electronic clinical quality measure (eCQM)?
- Where do I find eCQMs?
- What is included in an eCQM specification?
- What resources are helpful to successfully implement eCQMs?
- What resources are available to help me test the eCQMs?
- Where do I find which eCQMs are used in Centers for Medicare & Medicaid Services (CMS) quality programs?
- Where do I find key resources to help me understand eCQMs?
- Where do I go for help regarding use of eCQMs in CMS Quality programs?
- How do I submit eCQMs to CMS?
What is an eCQM?
eCQMs

- eCQMs use data electronically extracted from electronic health records (EHRs) and/or health information technology systems to measure the quality of health care provided.
- CMS uses eCQMs in a variety of quality reporting programs.
- Eligible Professional (EPs), Eligible Clinicians, Eligible Hospitals (EHs), and Critical Access Hospitals (CAHs) report eCQMs to CMS.
Building an eCQM

• Data Model - What data to look for in the patient’s medical record to capture and report
• Expression Logic - How to calculate the results of the data captured in order to measure that the ‘right’ care was provided
• Structure - metadata, numerator, denominator, exclusions, exceptions
Data Model: Quality Data Model (QDM)

- The QDM is an information model that defines relationships between patients and clinical concepts in a standardized format to enable electronic quality performance measurement.
- The model is the current structure for electronically representing quality measure concepts in eCQM development and reporting.
- QDM Datatypes

- **Category**
  - Examples: Laboratory Test, Diagnostic Study, Diagnosis, Encounter, Medication

- **Category (Context)**
  - Examples: Performed, Ordered, Recommended, Administered, Dispensed

- **Value Set**
  - Code
  - System
  - Code(s)
  - Examples: LOINC – Lab tests / observable entities, SNOMED-CT – Conditions, Procedures, RxNorm – Medications (administered or ingredient level)

- **Attribute**
  - Examples: Detailed, fully specified data element, including attributes e.g.,
  - Result thresholds
  - Location arrival time
eCQM Data Element

• **Category** - Consists of a single clinical concept identified by a value set. A category is the highest level of definition for a QDM element. QDM version 5.3 contains 19 categories. Some examples of categories are Medication, Procedure, Condition/Diagnosis/Problem, and Encounter.
  ▪ Examples: ‘Medication’, ‘Laboratory Test’

• **QDM Datatype** - The context in which each category is used to describe a part of the clinical care process. Examples of QDM datatypes include ‘Medication, Active’ and ‘Medication, Administered’ as applied to the QDM Medication category.
  ▪ Examples: ‘Laboratory Test, Order’, ‘Laboratory Test, Performed’

• **QDM Attribute** - Provides specific details about a QDM data element. QDM data elements have two types of attributes, datatype-specific and dataflow attributes.
  ▪ Example: ‘Laboratory Test, Performed: (result)’
The eCQM DERep provides all the data elements associated with published and tested eCQMs for use in CMS quality reporting programs as well as the definitions and clinical focus for each data element. An end user can sort information by data element, eCQM, union, QDM attribute, or QDM category and datatype data element.

The data elements provided are for use by Eligible Professional/Eligible Clinician and Eligible Hospital/Critical Access Hospital eCQMs for quality reporting and performance periods. Information contained within the DERep is derived from the eCQM specifications, Quality Data Model 5.3, and the Value Set Authority Center (VSAC). Each eCQM data element includes information about the value set, the QDM datatype, and the attributes used by that data element. Note: The data element descriptions may be updated in the DERep as compared to the VSAC. These descriptions will ultimately be in sync with the descriptions contained in the VSAC in Spring 2019.

The eCQM data elements provide a listing of all data elements used in eCQMs for 2019 CMS quality reporting and performance periods. Each eCQM data element includes information about the value set, the QDM datatype, and the QDM attributes used by that data element. Note: DERep data element descriptions may not yet be updated in the VSAC. The DERep and VSAC data element descriptions will be synchronized in Spring 2019.

https://ecqi.healthit.gov/collaborative-measure-development#quicktabs-tabs_cmd2
CQL is a Health Level 7 International (HL7) authoring language standard that is human readable. CQL is the expression logic used in Health Quality Measure Format (HQMF) for eCQMs implemented in calendar year 2019.

The HQMF is the basic electronic specification for the measure. It provides the metadata and population structure. The QDM provides the data model, but CQL represents the logic used in the HQMF.

The QDM provides information to help finalize the HQMF which is divided into two parts: the data model and the logic. CQL replaces the logic expressions previously defined in the QDM.
Benefits of CQL

- Expresses measure logic that is easily human readable yet structured enough for processing a query electronically
- Provides for measure logic that can be shared between measures
- Harmonizes the standards used for eCQMs and Clinical Decision Support (CDS)
- Simplifies calculation engine implementation
- Can be used with multiple information data models, e.g., QDM, Fast Healthcare Interoperability Resources (FHIR)
Where do I find eCQMs?
eCQI Resource Center

https://ecqi.healthit.gov/

*NEW* Collaborative Measure Development Workspace

Electronic Clinical Quality Improvement (eCQI) Resource Center - The one-stop shop for the most current resources to support electronic clinical quality improvement.

Featured Resources

- Eligible Professional / Eligible Clinician eCQMs
- Eligible Hospitals / Critical Access Hospital eCQMs
- Educational Resources
Example: Finding Eligible Hospital / Critical Access Hospital eCQMs and Materials

The electronic clinical quality measures (eCQMs) are updated for calendar year 2019 reporting for the Hospital Inpatient Quality Reporting (IQR) Program and the Medicare and Medicaid Promoting Interoperability programs for Eligible Hospitals and Critical Access Hospitals. Measures will not be eligible for 2019 reporting unless and until they are proposed and finalized through notice-and-comment rulemaking for each applicable program.

Each year, CMS makes updates to the eCQMs adopted for submission in CMS programs. CMS requires the use of updated eCQMs for all its quality programs because they include updated codes, logic corrections, and clarifications. Reporting eCQM data to the Hospital IQR Program and for aligned credit for reporting of eCQMs to the Promoting Interoperability programs requires that hospitals use the most current version of the eCQMs identified below for the applicable reporting period.

In addition, CMS may publish addenda to the eCQM updates. The addenda provide updates to the codes used in value sets based on code system changes.

CMS has updated eCQMs for potential inclusion in the following programs:

- Hospital Inpatient Quality Reporting (IQR) Program
- Medicaid Promoting Interoperability Program for Eligible Hospitals and Critical Access Hospitals (formerly known as the Medicaid Electronic Health Record (EHR) Incentive Program)
- Medicare Promoting Interoperability Electronic Health Record (EHR) Incentive Programs for Eligible Hospitals and Critical Access Hospitals (formerly known as the Medicare EHR Incentive Program)

Use eCQM Materials and follow the eCQM Implementation Checklist to update your electronic health record and processes for eCQM use and reporting.

Select Reporting Period: 2019

2019 REPORTING PERIOD ELIGIBLE HOSPITAL / CRITICAL ACCESS HOSPITAL ECQMS

<table>
<thead>
<tr>
<th>For Use</th>
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https://ecqi.healthit.gov/eligible-hospital-critical-access-hospital-ecqms
Example: Finding Eligible Hospital / Critical Access Hospital eCQMs and Materials (Cont’d)

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2019 REPORTING PERIOD ELIGIBLE HOSPITAL / CRITICAL ACCESS HOSPITAL ECQMS

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-USHIK Links are not updated for the 2019 Reporting Period.

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<tr>
<th>Measure Name</th>
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<td>CMS9v7</td>
<td>0480</td>
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<td>Version Detail</td>
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https://ecqi.healthit.gov/eligible-hospital-critical-access-hospital-ecqms
Example: Individual Measure Page - Measure Specifications and DERep

https://ecqi.healthit.gov/ecqm/measures/cms50v7
Example: Individual Measure - Data Element Repository

CMS50v7 - Closing the Referral Loop: Receipt of Specialist Report

Rationale:
Closing the Referral Loop: Receipt of Specialist Report. Problems in the outpatient referral and consultation process have been documented, including lack of timeliness of information and inadequate provision of information between the specialist and the requesting physician (Gandhi, 2000; Forrest, 2000; Stille, 2005). In a study of physician satisfaction with the outpatient referral process, Gandhi et al. (2000) found that 68% of specialists reported receiving no information from the primary care provider prior to referral visits, and 25% of primary care providers had still not received any information from specialists 4 weeks after referral visits. In another study of 963 referrals (Forrest, 2000), pediatricians scheduled appointments with specialists for only 39% and sent patient information to the specialists in only 51% of the time. In a 2006 report to Congress, MedPAC found that care coordination programs improved quality of care for patients, reduced hospitalizations, and improved adherence to evidence-based care guidelines, especially among patients with diabetes and CHD. Associations with cost-savings were less clear; this was attributed to how well the intervention group was chosen and defined, as well as the intervention put in place. Additionally, cost-savings were usually calculated in the short-term, while some argue that the greatest cost-savings accrue over time (MedPAC, 2006). Improved mechanisms for information exchange could facilitate communication between providers, whether for time-limited referrals or consultations, on-going co-management, or during care transitions. For example, a study by Branger et al. (1999) found that an electronic communication network that linked the computer-based patient records of physicians who had shared care of patients with diabetes significantly increased frequency of communications between physicians and availability of important clinical data. There was a 3-fold increase in the likelihood that the specialist provided written communication of results if the primary care physician scheduled appointments and sent patient information to the specialist (Forrest, 2000). Care coordination is a focal point in the current health care reform and our nation’s ambulatory health information technology (HIT) framework. The National Priorities Partnership recently highlighted care coordination as one of the most critical areas for development of quality measurement and improvement (NPP, 2008).

Data Elements
What is included within an eCQM specification?
eCQMs are developed in the MAT and produce human and machine readable files.
eCQM Components

- Human readable Hyper Text Markup Language (HTML) file
  - Ex: CMS2v8.html
- Machine readable
  - HQMF XML file
    - Ex: CMS2v8.xml
  - CQL files
  - Expression Logical Model (ELM) XML
  - ELM JavaScript Object Notation (JSON) XML

Note: Value sets and direct reference codes in the eCQM specifications are found in the Value Set Authority Center (VSAC) and require a UMLS license to access.
The measure header in the human readable file includes:

- Measure Developer
- Measure Steward
- Brief description of the measure
- Rationale for the measure and evidence it is based on
- What relevant clinical guidelines exist
- What copyright restrictions exist
- What the measure type is
- How the measure is scored
- Who has endorsed the measure
- Any additional guidance
- A summary of the different fields/criteria

The measure header alone **cannot** be used to calculate the measure!
Think of the measure logic as an equation of sorts— it relates different pieces of information together and calculates a measure result.

Excerpt from the eCQM Specification on the eCQI Resource Center: https://ecqi.healthit.gov/system/files/ecqm/measures/CMS2v8.html
The HQMF is an xml-based standard that shows the measure content, both machine-readable logic and the human-readable header, in a way that a machine can parse the content into sections and perform calculations.

While it does take some investment to create a tool that “reads” the HQMF, it can be used to import the measure and generate the measure results automatically.
What resources are helpful to successfully implement eCQMs?
Key eCQM Materials

- **Guide for Reading eCQMs** provides a detailed overview of reading eCQMs and eCQM-related documents.
- **eCQM Logic and Implementation Guidance document** provides guidance for understanding, using, and implementing eCQMs.
- **Implementation Checklist**
- **Measure Specific:**
  - Technical Release Notes
  - Value Sets and Direct Reference Codes in the VSAC
  - eCQM Flows
eCQM Implementation Checklist

The Centers for Medicare & Medicaid Services (CMS) requires an eligible professional (EP), eligible clinician, eligible hospital (EH) or critical access hospital (CAH) to use the most current version of the eCQM for quality reporting programs.

This Pre-Check Checklist assumes that a health care practice/organization has determined which measures to report on. It provides the necessary technical steps (health information technology (IT) developers, implementers, and health care organizations must take to update their systems and processes with the eCQM Annual Update for the upcoming reporting and performance periods. The most recent eCQM Annual Update should be applied to your system for use in electronic quality reporting.

**Pre-Check**

1. Sign up for a Unified Medical Language System (UMLS) account
2. Sign up for a JIRA account
3. Sign up for eCQM page change notifications on the eCQI Resource Center
4. Review the code versions used in the Annual Update
5. Review the standards, tools, and documents used in the Annual Update

**Checklist**

1. Access the appropriate eCQM Annual Update
2. Secure detailed information about each measure
3. Download value sets
4. Prepare to implement the updates by understanding changes to the eCQM
5. Prepare to report the updated eCQMs
6. Reach out for help

https://ecqi.healthit.gov/ecqm-implementation-checklist
# Technical Release Notes (TRNs)

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<td>CMS ORDA I Schematron s, and Sample Files for Hospital Quality Reporting (zip)</td>
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VSAC houses the value sets used by eCQMs and is maintained by the National Library of Medicine.
# 2019 Reporting/Performance Period eCQM Value Sets and Direct Reference Codes

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<th>Available Downloads</th>
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<th>Sorted by Value Set Name*</th>
<th>Sorted by Quality Data Model Category*</th>
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<td>Excel (xlsx)</td>
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A **Value Set** is a list of specific values, terms, and their codes, used to describe clinical and administrative concepts used in eCQMs.

A **Direct Reference Code (DRC)** is a specific code that is referenced directly in the eCQM logic to describe a data element or one of its attributes. DRC metadata include the description of the code, the code system from which the code is derived, and the version of that code system.
Screening for Clinical Depression and Follow-up Plan

Excerpt from the eCQM measure flows:
https://ecqi.healthit.gov/system/files/2019_eCQM_Flow_s-1of3-V2.zip
What resources are available to help me test the eCQMs?
Bonnie: An eCQM Testing Tool

https://bonnie.healthit.gov/

BONNIE

A tool for testing electronic clinical quality measures

streamlined and efficient

developer empowerment

quality reporting

pretesting for eCOMs

provides specific feedback on the behavior of the CQM logic

supports the CMS Quality Reporting Programs

Bonnie is a tool for testing electronic clinical quality measures (eCOMs) designed to support streamlined and efficient pre-testing of eCOMs, particularly those used in the CMS Quality Reporting Programs.
Bonnie: An eCQM Testing Tool
https://bonnie.healthit.gov/ (Cont’d)

• Bonnie is a software tool that allows eCQM developers to test and verify the behavior of their eCQM logic.
• The Bonnie application allows measure developers to independently load measures that they have constructed using the Measure Authoring Tool (MAT) and helps measure developers execute the measure logic against the constructed patient test deck and evaluate whether the logic aligns with the intent of the measure.
Cypress Testing Tool - Demo Server

https://cypressdemo.healthit.gov/users/sign_in
Cypress is an open source testing tool used by vendors to certify their EHRs and health information technology (IT) modules for calculating eCQMs. Cypress is an official testing tool for the ONC EHR Certification Program.

Testing involves Cypress generating synthetic patient records for the subset of published eCQMs selected for certification and testing the ability of the EHR systems and health IT modules to accurately record, import, calculate, filter, and report eCQMs.
Where do I find which eCQMs are used in CMS quality programs?
# CMS Measures Inventory Tool

**Source:** [CMS Measures Inventory Tool](https://cmit.cms.gov/CMIT_public/ListMeasures)

### Measure Inventory

- **Search Functionality:**
  - Enter keywords or ID to search the measures inventory.

- **Filter Options:**
  - Programs
  - Current Status
  - Measure Type
  - NQF Endorsement Status
  - Development Stage
  - Meaningful Measure Area
  - Measure Groups
  - Healthcare Priority
  - Reporting Level
  - Purposes
  - Care Settings
  - Core Measures Set
  - Data Sources
  - Conditions
  - Subconditions
  - eCQM Spec Available

### Measure Results

- **Measure Content Last Updated:** 2018-08-23
- **Issues:**
  - What are the Status Definitions?

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<th>Measure Title</th>
<th>Measure Type</th>
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- **Programs:**
  - Medicare and Medicaid Electronic Health Record Incentive Program for Eligible Professionals (Removed)
  - Merit-Based Incentive Payment System (MIPS) Program (Implemented)
  - Medicaid Promoting Interoperability Program (Proposed)

- **Status Definitions:**
  - Endorsed
  - Not Endorsed
  - Implemented
  - Proposed
  - Removed
CMS publishes eCQMs for potential inclusion in several quality reporting programs:

- Hospital Inpatient Quality Reporting (IQR) Program
- Medicaid Promoting Interoperability Program
- Medicare Promoting Interoperability Program for Eligible Hospitals and Critical Access Hospitals
- Quality Payment Program: The Merit-based Incentive Payment System (MIPS) and Advanced Alternative Payment Models (Advanced APMs)
- Advanced APM: Comprehensive Primary Care Plus (CPC+)
Where do I find key resources to help me understand eCQMs?
The eCQI Resource Center is the ‘one-stop shop’ for the most current resources to support electronic quality improvement.

https://ecqi.healthit.gov
eCQI Resource Center – eCQM and eCQI Educational Resources

https://ecqi.healthit.gov/ecqm-and-eqli-education-resources
Glossary

Alignment
Measure alignment includes using the same quality measures and value sets across settings and within multiple programs when possible. Alignment is achieved when a set of measures works well across settings or programs to produce meaningful information without creating extra work for those responsible for the measurement.

Clinical Decision Support
Clinical Decision Support (CDS) is health information technology functionality that builds upon the foundation of an electronic health record (EHR) to provide persons involved in care processes with general and person-specific information, intelligently filtered and organized, at appropriate times, to enhance health and health care.

Clinical Decision Support developer
A Clinical Decision Support (CDS) developer is an individual or organization that translates knowledge to a structured and/or executable tool that aids in making evidence-informed decisions about a patient’s health care. CDS developers may or may not be the original knowledge authors (e.g., guideline developers, subject matter experts) or the final implementers. They are responsible for ensuring that the original clinical knowledge is reflected, accurately and consistently, in the appropriate standard coding schemes, e.g., CCL, and terminologies such as Current Procedural Terminology (CPT) and SNOMED CT, accounting appropriately for intellectual property and licensing.

Clinical Quality Measure
A clinical quality measure (CQM) is a mechanism used for assessing the degree to which a provider competently and safely delivers clinical services that are appropriate for the patient in an optimal time frame. CQMs are a subset of the broader category of performance measures.
Where do I go for help regarding use of eCQMs in CMS Quality programs?
eCQM Implementation Questions
ONC Project Tracking System (JIRA)

https://oncprojecttracking.healthit.gov
CMS Policy/Quality Reporting Program Questions

- Hospital Inpatient Quality Reporting (IQR) Program - Hospital Inpatient Value, Incentives, and Quality Reporting Outreach and Education Support [https://cms-ip.custhelp.com](https://cms-ip.custhelp.com) or (844) 472-4477
- Medicare and Medicaid Promoting Interoperability Programs - Quality Net Help Desk [qnetsupport@hcqis.org](mailto:qnetsupport@hcqis.org) or (866) 288-8912
- Quality Payment Program (QPP) - [QPP@cms.hhs.gov](mailto:QPP@cms.hhs.gov) or (866) 288-8292
- Quality Net reporting, data upload, Pre-Submission Validation Application (PSVA), etc. - Quality Net Help Desk [qnetsupport@hcqis.org](mailto:qnetsupport@hcqis.org) or (866) 288-8912
How do I report eCQMs to CMS?
eCQM Reporting Standards

- Quality Reporting Document Architecture (QRDA)
  - Category I for patient level data
  - Category III for aggregate data
The QRDA is the data submission standard used for a variety of quality measurement and reporting initiatives. It creates a standard method to report quality measure results in a structured, consistent format and can be used to exchange eCQM data between systems.

An HL7 Clinical Document Architecture (CDA)-based standard which further constrains CDA Release 2 for exchange of eCQM data.

CMS publishes QRDA Implementation Guides (IGs), Schematrons, and sample files annually to provide technical guidance for implementing the HL7 QRDA standards for reporting to CMS quality reporting programs.
QRDA (Cont’d)

- QRDA was adopted by the Office of the National Coordinator for Health Information Technology (ONC) as the standard to support both QRDA Category I (individual patient) and QRDA Category III (provider’s aggregate) data submission for quality reporting.
Testing QRDA: Cypress Validation Utility (CVU) and Pre-Submission Validation Application (PSVA)

- Cypress Validation Utility
  - The Cypress Validation Utility (CVU) conformance tool provides implementers with the ability to validate the conformance of QRDA Category I and Category III documents to CMS implementation guides.

- Pre-Submission Validation Application (PSVA)
  - The PSVA is an application program interface (API) which provides vendors, hospitals, and providers with a method for validating eCQM files within their own system/environment prior to submission and for securely transporting valid files to the CMS. The PSVA tool has three interfaces as part of the download package and a user is able to select the option that best meets their needs.

https://cypressvalidator.healthit.gov/
https://ecqi.healthit.gov/ecqi-tools-key-resources/cms-qrda-pre-submission-validation-tools-guide
Where to Submit eCQMs

- Eligible Clinicians - QPP - https://qpp.cms.gov/
Where do I find more information about the eCQMs?

Electronic clinical quality measures (eCQMs) use data electronically extracted from electronic health records (EHRs) and/or health information technology systems to measure the quality of health care provided. The Centers for Medicare & Medicaid Services (CMS) use eCQMs in a variety of quality reporting and value-based purchasing programs.

There are several benefits of using eCQMs:
- eCQMs use detailed clinical data to assess the outcomes of treatment by healthcare providers and organizations
- eCQMs reduce the burden of manual abstraction and reporting for provider organizations
- eCQMs foster the goal of access to real-time data for bedside quality improvement and clinical decision support

Hospitals, professionals, and clinicians use eCQMs to provide feedback on their care systems and to help them identify opportunities for clinical quality improvement. eCQMs are also used in reporting to CMS, The Joint Commission, and commercial insurance payers in programs that reimburse providers based on quality reporting.

Find eCQMs:
- **Eligible hospital** (EH) and critical access hospital (CAH) eCQMs and supporting materials are on the [eligible hospital/critical access hospital](https://ecqi.healthit.gov/ecqm) page of this website.

- **Eligible professional** (EP) and **eligible clinician** eCQMs and supporting materials are on the [eligible professional/eligible clinician](https://ecqi.healthit.gov/ecqm) page of this website.
## Acronyms

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<td>CDA</td>
<td>Clinical Document Architecture</td>
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<td>CDS</td>
<td>Clinical Decision Support</td>
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<td>CMS</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
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<td>CQL</td>
<td>Clinical Quality Language</td>
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<td>CAH</td>
<td>Critical Access Hospitals</td>
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<td>DERep</td>
<td>Data Element Repository</td>
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<td>DRC</td>
<td>Direct Reference Code</td>
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<td>eCQI</td>
<td>Electronic Clinical Quality Improvement</td>
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<td>eCQM</td>
<td>Electronic Clinical Quality Measure</td>
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<td>EHR</td>
<td>Electronic Health Record</td>
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<td>EH</td>
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<td>ELM</td>
<td>Expression Logical Model</td>
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<td>EP</td>
<td>Eligible Professionals</td>
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<td>FHIR</td>
<td>Fast Healthcare Interoperability Resources</td>
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<td>HL7</td>
<td>Health Level Seven International</td>
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<td>Acronym</td>
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<td>HQMF</td>
<td>Health Quality Reporting Format</td>
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<td>JSON</td>
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<td>NLM</td>
<td>National Library of Medicine</td>
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<td>ONC</td>
<td>Office of the National Coordinator for Health Information Technology</td>
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<td>Quality Data Model</td>
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<td>VSAC</td>
<td>Value Set Authority Center</td>
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<td>XML</td>
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