ONC SIM Health IT Resource Center
Health IT-Enabled Quality Measurement Strategic Implementation Guide

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This document is effective as of the date of publication. Please refer to the underlying regulations and statutes to the extent these materials may be superseded in the future.

Acknowledgements:

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About the Implementation Guide

This document provides guidance for the development and execution of a statewide multi-stakeholder health-IT enabled quality measure strategy and accompanying technical framework. The guidance addresses targeted implementation of priority use cases producing early successes within the context of designing for an advanced quality improvement ecosystem and implementation of value based payment arrangements across payers. This guide was preceded by a Center for Medicare and Medicaid Innovation (CMMI) Office of the National Coordinator (ONC) Learning Event on electronic Clinical Quality Measures (eCQMs) to support value-based payment models; subsequent Affinity Group sessions; and an ONC hosted Health IT-enabled Quality Measurement In-Person Technical Assistance Convening. The Appendices include state examples and detailed guidance documents posing questions to ask, decision points, and planning considerations.

Use of this Guide

The primary audience for this guide includes states and public-private stakeholder groups advancing quality measurement for alternative payment models (APMs). This guide can be used by states and their stakeholders to make progress on their state objectives through achieving multi-payer agreement and alignment on e-performance measures and shared health IT modular functions and infrastructure[1] for extraction, reporting, feedback and use of health IT enabled measurement.

Scope

The Implementation Guide addresses health IT-enabled quality measurement with a specific focus on clinical quality measurement that can be used for various payment models. The Implementation Guide does not focus on a specific payment model. The Implementation Guide does not focus on specific payers (public or private) but supports a payer-agnostic broad health IT-enabled eCQM technical framework that can include Medicare, Medicaid, and commercial payers. While the eCQM development process is not addressed, the guidance demonstrates how to plan and implement a roadmap for advancing quality measures, and points to eCQM development resources, such as the eCQI Resource Center.

The Implementation Guide provides general guidance on health IT-enabled quality measurement and references relevant rules as additional resources. However, it does not provide specific regulatory guidance related to Qualified Clinical Data Registries (QCDRs) or Qualified Entities (QEs).

The Implementation Guide's topics include multi-payer alignment of clinical and non-clinical performance measures and the creation and use of shared health IT systems and functionality for clinical quality data for quality improvement and measurement. The Implementation Guide does not focus on the selection of performance metrics.

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[1] Appendix B: Modular HIT Functions Guide

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Executive Summary

The health care system is transitioning from one predominantly driven by fee-for-service (FFS) payment, paying for volume of services, to paying for value through alternative payment models. The goals of health care delivery system reform including value based payment are to achieve better care, smarter spending, and better health. Successful execution of alternative payment models (APMs) requires cooperative strategic planning and coordinated implementation of quality and performance metrics, data driven quality improvement, and shared health information technology (health IT) systems and functionalities.

States are in a unique position to implement and extend health IT solutions to support quality measurement collection and reporting across providers and payers in geographically aligned regions. This Implementation Guide presents a strategy and implementation framework for aligning stakeholders, goals, quality metrics, and the enabling data and health IT architecture. The following activities are essential to building a quality measurement strategy supporting APMs across national, state, and private endeavors:

1. Establish a flexible, inclusive governing structure with common business use cases and core objectives.
2. Define a measurement system for payment, quality improvement, quality reporting, and health care service delivery.
3. Identify core quality measures that can be aligned across programs and payers.
4. Facilitate stakeholder buy in for efficient approaches to shared services that reduce burden on providers, reduce cost to payers and improve reliability of performance measurement.
5. Assess the technical infrastructure and health IT functions, data collection, aggregation, analytics services, and reporting services, required to support clinical quality and measurement.
6. Prioritize development of health IT functions to support priority business use cases.
7. Build coordinated and scalable implementation plans and timelines.
8. Coordinate quality improvement technical assistance and education.
9. Identify multi-payer financing options for implementation and sustainability.
10. Use policy levers and other mechanisms to sustain and continually improve quality measurement capabilities and capacity.

Introduction

Implementation of health care delivery transformation through alternative payment models (APMs) requires multi-stakeholder engagement, measurement of the triple aim, and technical infrastructure and functions for multiple purposes. Stakeholders across service delivery and payment settings will need to identify common goals, rules of engagement, and a roadmap with tactical steps to successfully implement the quality measurement collection and feedback mechanisms needed to move toward paying for value. Stakeholders include states, the federal government, public and private payers, and providers aligned across programs and geography. Measurement includes total cost of care and clinical quality metrics, as well as utilization and experience measures. Technical infrastructure and functionality are needed to support the collection, aggregation, analysis, and dissemination of quality results based on a combined data sets from a variety of data sources, including claims and other administrative data, EHR-generated clinical data, as well as other types of data (e.g., patient generated health data).

CQMs and eCQMs

Quality Measures (QM) – Quality measures are tools that help us measure or quantify healthcare processes, outcomes, patient perceptions, and organizational structure and/or systems that are associated with the ability to provide high-quality health care and/or that relate to one or more quality goals for health care. These goals include: effective, safe, efficient, patient-centered, equitable, and timely care.[2]

Electronic Clinical Quality Measures (eCQMs) – eCQM is a clinical quality measure that is expressed and formatted to use data from electronic health records (EHR) and/or health Information technology systems to measure health care quality, specifically data captured in structured form during the process of patient care.[3]

Health IT-enabled Quality Measurement – The measurement of cost and quality utilizing a broader universe of data sources, aggregation, analytics, reporting, and feedback applications and functions enabling population-, community-, and patient-centric measurement informing total cost of care, quality of care, and improved outcomes.

Framework for Addressing Quality Measurement and Technology

> "What gets measured gets managed[4]. What gets managed gets done."

Implementation of health care delivery transformation through alternative payment models (APMs) depends on the engaged stakeholders (payers, state and providers) understanding and agreeing on the goal(s) and value proposition of the endeavor. The ability to move from conceptual agreement on a specified goal or set of goals to validated success depends on gaining stakeholder buy in and alignment and implementation of quality measures/metrics. Efficient and effective execution requires optimization of health IT.

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[2]   https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/index.html?redirect=/QualityMeasures/
[3]   https://ecqi.healthit.gov/content/glossary-ecqi-terms
[4]   https://athinkingperson.com/2012/12/02/who-said-what-gets-measured-gets-managed/

Multi-payer quality measurement alignment and related optimization of health IT requires first a common understanding and agreement on the APM delivery and payment goal(s), not only conceptually but operationally. Based on the delivery and payment goal(s), the quality information needs of the state, payers, and providers must be understood. Beyond that, these stakeholders must also know the data and health IT requirements for achieving their quality information needs. For information to flow to produce, manage, and disseminate quality measurement, three core elements must exist:

(1) The value proposition must be understood, and it must provide a sufficient reason for each party to engage and commit to a set of deliverables/outcomes,

(2) All the participants must trust the process and the outcome, and this trust must be codified in the requisite governance, legal, and financing agreements,

(3) The secure technical infrastructure, exchange, and aggregation capacity must exist.

> **Exchange of Information for Quality Measurement Core Elements:**
> - Value Proposition
> - Trust
> - Technology Capability & Capacity

The following additional factors impact the agreement on the goal(s) and value proposition:

- **Clarity on the current state** – The "current state" of provider, care delivery system (PCMH/ACO), payer, and state data and health IT should be known. Later decision-making efforts demand a unified understanding of what is feasible for the immediate APM approach based on the current health IT environment, as well as the potential for timely access to data sources beyond claims, such as EHRs, registries, person–generated health data, etc. A state can leverage state HIT roadmaps or the Medicaid agency's State Health IT Medicaid Plan (SMHP) in assessing the current state of data and health IT. The SMHP can be updated regularly and documents the "as is" state of current technology adoption, interoperability of information, and actions underway or planned to support the State Medicaid Agency's "to be" state. The SMHP is a good resource, but it may not account for private investments that are not part of the statewide health IT ecosystem. See Appendix B.

- **Appreciation of the timing urgency** – With federal programs as accelerators, states, payers and providers are working to implement value-based payment models in the immediate future. There are multiple policies and initiatives facilitating the transition to paying for value and better care, such as Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), which is designed to incentivize Alternative Payment Models, and CMMI demonstration projects, including but not limited to the Comprehensive Primary Care Initiative (CPCI) , and the State Innovation Models (SIM) Initiative. Appendix A provides a table describing these efforts and others in additional detail.

> **Delivery System Reform Goals**
> HHS has set goals to shift Medicare fee-for-service payments to quality or value through alternative payment models tying **30 percent** of payments by 2016 and **50 percent** by 2018.

- **Addressing perceived and real stakeholder barriers and concerns:** Dealing with the "elephant in the room" is critical for building trust and moving forward to action. Possible areas of conflict to address include:
    - Competition among stakeholders on ownership and access to data,

- Relevance of reports to payer/provider needs,
- Focus on electronically specified measures and data integrity,
- Variety of health IT platforms,
- Attribution and resolution for duplicates,
- Relationship to Healthcare Effectiveness Data and Information Set (HEDIS) (including moving away from HEDIS),
- Transition issues from claims and medical chart audits approaches (manual to electronic),
- Role of surveys (CAHPs/ BSFS).

- **People/Participants**: Buy-in and sustained engagement is dependent on participation by the right level of people within the right organizations (e.g., payers, providers, states) with decision making authority and executive support. In addition, implementation stages require content experts and champions of the process with adequate knowledge to move the process forward and sustain the effort. Use of facilitators is also important to enable the decision-making processes.

- **Convening:** To support the people/participants, agreement on the convener is important. The convener can be an individual or group responsible for bringing people together to address an issue, problem, or opportunity typically involving assembling representatives from multiple sectors for a multi-meeting process, typically on complex issues[5]. There are multiple entities that can function as a convener, and work across provider organizations, payers, and stakeholders to support public interests. States can potentially play the role of a convening entity. In many ways they are uniquely positioned for this role. States maintain unique data systems with social, economic, and other public health data that could be used to compile a more complete health picture. States can also use Medicaid funding for convening and planning that supports the administration of the Medicaid program in aligning with statewide strategies. (See section Financing Quality Measurement for additional information).

- **Governance Structure:** There are three types of governance and all need to be addressed.
    - Organizational governance, which includes roles and responsibilities of stakeholders (providers, hospitals, public and private payers, data intermediaries) to advise, financially support, and facilitate achieving the e-performance measurement vision and objectives;
    - Legal/functional governance, which contains the tactical, legal framework for data senders, data receivers, and the appropriate use of this clinical quality information (e.g., data use and reuse agreements, privacy policies, federal and state rules); and
    - Technical governance, which includes data management specifications across data sources, data intermediaries, and data receivers to support shared quality measurement priority use cases for a value based system and to improve population health.

- **Processes**: Establishment of a structure without the appropriate processes is ineffective. The governance process must address when and how to include providers and stakeholders in the discussion with multi-payers. Guiding accountability/rules of engagement documents, such as

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[5] http://collaborativeleadersnetwork.org/leaders/the-role-of-the-convenor/

MOUs/charters with logistics, time commitment, and participation requirements by person or by organization (and substitution or proxy voting rules for participation by others from same organization) must exist. Critical to success is assuring legal and practical parameters are established to get the right people to commit the time and resources to the process. Potential topics to address include:

- Identifying available data sources,
- Strategizing on data extraction,
- Defining minimum data quality,
- Determining specifics of data transport (other working group) specifications,
- Creation/funding of shared data infrastructure for collection, reporting and feedback on performance.

Examples are noted in [Appendix B: Health IT Modular Functions](#) and [Appendix D: Assessing Quality Measurement Capability](#).

Alternate payment models are intended to support substantial transformation of the healthcare delivery system. Restructuring processes will take time and require ongoing cycles of planning, implementation, improvement, and review. Understanding the motivating factors and drivers informs and enables providers and payers to work together on APMs data strategies and supports a space where coordination and collaboration can occur to improve quality. Access and use of reliable and valid data is the essential underpinning in any care coordination, quality improvement and measurement APM data strategy. State agencies also need measurement capabilities to fulfill monitoring, regulatory, and policy missions in the interest of the populations they serve.

Quality Measurement and Related Technology Strategy

Building a quality measurement and related technology strategy requires an interactive, flexible approach. It is important to identify "who" needs to be part of the planning discussions, "why" the group is coming together, "what" will be achieved, and "how" will it be done. It is also important to identify the convening entity that will drive execution on these questions. States are well positioned to be conveners to work across provider organizations, payers, and stakeholders in support of the public interests.

Core foundations to building an interactive strategic planning process include:
- Developing a business case with a sufficient value proposition for each party to engage in and commit to a set of deliverables and outcomes.
- Determining who should be at the table and what the expected rules of engagement for participation are. Agreements must be very granular so everyone understands what is being committed to financially and operationally, for how long, by whom, what policy levers will be applied, what parameters are needed to move forward, and what technology will be used.
- Establishing a process for all participants to have trust in the process and outcomes to ensure they actively participate in producing the agreed upon set of deliverables and outcomes and then acting upon them within their organization. This includes clarifying decision points, including how decisions will be made and when a decision is final.

- Identifying and prioritizing use cases to support the value proposition.
- Understanding and leveraging the current quality measurement and health IT infrastructure and services. Evaluating the strength of the Health IT Functions ([see Appendix B](#)) of key stakeholder groups is critical to determine readiness to move forward with implementation. Assessing if the components are in place and informing what needs to be created and/or strengthened, and determines whether a good base exists for sharing data and participation in comparative measurement.
- Identifying measurement and health IT gaps, and then designing toward a desired future state. The maturity and adequacy of the foundational health IT components will vary for different provider groups, payers, state agencies, other stakeholders, and across geographic regions. Judgments will need to be made as to where and for whom they are adequate, where they need to be enhanced, and which stakeholders are likely to engage early on.
- Establishing and executing multi-payer strategies and tactical operational activities are imperative for accountability and oversight that include people, processes, policies, technology, and financing to efficiently and effectively support the efforts.

Questions to consider addressing the core foundations identified above are provided in [Appendix D: Assessing Quality Measurement Capability.](#)

Operationalizing Quality Measurement and Related Technology Strategy

Quality Measurement Priority Use Cases

Executing a quality measurement strategy requires agreement on prioritized use cases that meet current needs while building the basis to support future use cases. Whether supporting APMs or expanding population health measurement capacity, identifying the priority uses for clinical quality information is critical for alignment of stakeholders, programs, and measures toward common goals. Following is a list of priority use cases to consider when creating a roadmap for building CQM technical capacity.

- Measure Quality of Care and Improvement**:** Create technical capacity and procedures for calculating, measuring, providing feedback and improving the quality of clinical care delivery at the individual clinician, group practice, and provider network and community levels.
- Cohort Identification and Management**:** This includes clinical decision support, analysis of gaps in care, cohort identification, and developing an understanding of controlled and uncontrolled patient cohorts.
- Meet Multiple Quality Measure Reporting Requirements**:** Address variation to improve financial and quality measure collection and reporting requirements for different entities.
- Reimbursement for Improved Quality of Care and Clinical Outcomes: Support APM measures that include financial incentives rewarding providers for lower cost and better outcomes.
- Risk Adjustment for Quality Measurement: Support patient population risk adjustments, identifying higher risk populations, stratifying data by sub-population, or adjusting outcomes based on severity.

- Cost and Quality Transparency: Provide public transparency on cost and quality supporting better care decisions by consumers and purchasers.
- Program Evaluation**:** Build system evaluations that assess the impact of value-based payment reforms.
- Population Health Measurement: Support assessment of public health at geographic level, by organizational affiliation, or on non-clinical characteristics[6].

Quality Measure Alignment

In the current health care environment, there are varying measures for quality and performance. Examples include total cost of care using claims and other financial data; efficiency and utilization using claims and other data; and quality of health and of care provided using clinical data from multiple sources. Within the context of clinical quality measurement, the focus going forward will increasingly be on electronically created, accessible, and reportable data. To support this approach, the necessary data must exist, the data must be readily available from an accessible data source, and an appropriate quality measure must exist for the purpose. The data source for each may be different, as well as the purpose of the collection. The more likely the data source is digitized and the more feasible the transfer of the data via electronic means, the more viable the measure.

Alignment
Initiative Alignment: Optimizing standardized measure sets across quality improvement initiatives.
Measure 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.[7]
Macro Measure Alignment: Common eCQMs cross quality initiatives (e.g., Meaningful Use CPCi ACO, and MCO eCQMs).
Micro Measure Alignment: Standardized data value sets and measure specifications across programs and aligned measures.

It is important for multi-stakeholder groups participating in a combined measurement strategy to identify the specific measures and whether current measure sets can be reused or new measure sets need to be built. Measure alignment across initiatives, such as innovation programs or alternative payment models, can reduce the burden on participating providers by selecting subsets of standard measures, often using national measures and/or standard, NQF-endorsed measures. Measurement alignment must be considered at both the macro and micro levels (see "Alignment" box). Harmonizing measures establishes a prioritized and standardized set for providers so practices can focus their resources on data capture and improvement activities. Appendix E Aligning Quality Measures identifies current quality measures across Federal and State programs, as of December 2016.

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[6] Agency for Healthcare Research and Quality "Varieties of Measures in NQMC" https://www.qualitymeasures.ahrq.gov/help-and-about/summaries/varieties-of-measures-in-nqmc
[7] https://ecqi.healthit.gov/content/glossary-ecqi-terms

Quality Measurement Data Sources

The feasibility of any quality measure is dependent on availability and access to necessary data. The required data must exist, must be readily available from a data source, and the measure must be appropriate for the purpose. The data source for each measure may be different, as well as the purpose of the collection. If data sources are digitized, the potential cost of capturing and transfer of the data likely goes down, increasing the viability of the measurement activity. However, this depends heavily on the type of EHR or whether a provider is connected to broader health IT infrastructure and services. Upfront investments should be considered, as well as a potential significant level of effort and additional costs for small providers. The Financing Health IT-enabled Quality Measurement section identifies options available to states to assist with technology adoption and interoperability of information.

Documentation of available data sources[8] (private and public) is important for understanding the breadth and scope of types of data. However, consideration of the resources required to integrate and use this data for quality measurement purposes is necessary and part of the value proposition discussion among stakeholders.

Figure 1 Quality Measure Data Sources Examples
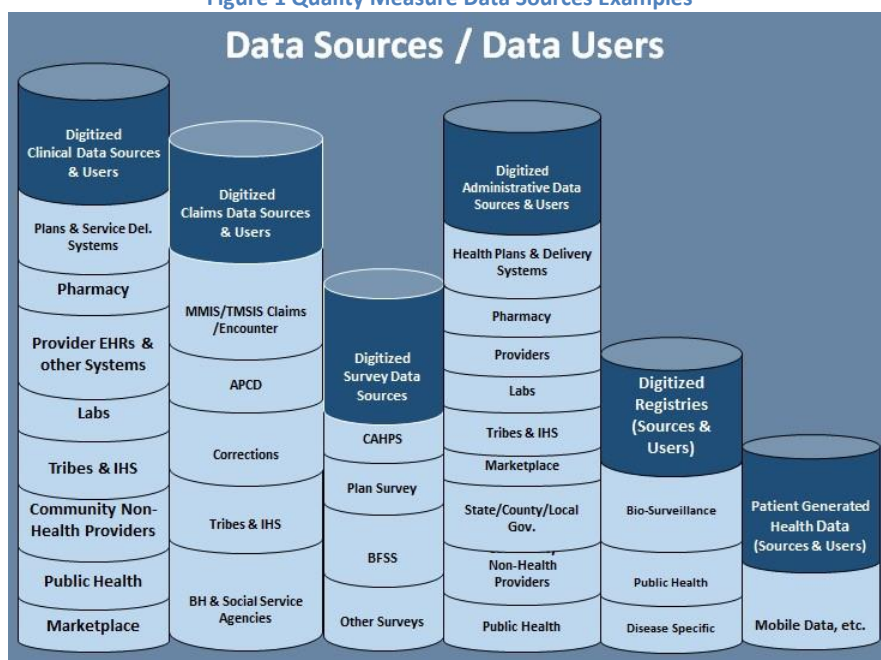
Data provides insights when it becomes information through the linked and organized collection of claims, clinical, administrative, financial, and other data types. Thus one of the major decision points is to determine what data to link, when, and for what purpose. Details related to formatting, data

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[8] Data sources exist beyond EHRs and claims. Viable potential data sources include provider systems and non-provider systems. Provider systems provide access to claims and clinical data through their EHRs and various ancillary systems (e.g., labs, radiology, etc.). Non-provider systems include state and commercial payer systems for claims, encounter data, eligibility, enrollment, financial, quality and administrative information; immunization registries other clinical and specialized registries; consumer survey systems (e.g. CAHPS), and quality, financial and administrative systems from Quality Information Organizations, APCDs, and other data integrators. Appendix D provides a visual of various data sources for consideration.

definitions, and defining the provenance[9] for data elements is required. Additional steps will be required to integrate non-digitized data with the digitized data, adding cost to the measurement enterprise.

Quality Measurement Information Users

In addition to understanding the quality measures, data sources, and how to extract, transport and use the measures, stakeholders must confirm who the users of the quality measurement information are and how they intend to use the measurement results. Regardless of whether it is national users (e.g., CMS or other Federal agencies), state users (e.g., Medicaid, public health, state legislature, or state employees), providers, other payers, private purchasers or evaluators, the goal is to gain efficiencies through collection, analysis and dissemination strategies that get the data once and allow for multiple uses as needed. Core to this approach is the need to assure the data is secure, accurate, and analyzed appropriately. This is dependent on agreement on standardized definitions, formats, timelines for data extractions, and coding specifications as noted in the following sections and Appendix H Data Extraction Taxonomy.

The Office of Chief Privacy Officer published the following guidance on HIPAA approved uses of health information for quality assurance and improvement. Hyperlinks to supporting material are noted in Appendix L: Additional Resources.

Technical Infrastructure to Support Quality Measurement

The technical architecture must accommodate the immediate business and operational demands of government, payers, and providers within the context of APMs. It must also be scalable to address future requirements, such as multi-payer APMs. In addition, the architecture must anticipate the advancement of technology and the evolution of standards and interoperability. The Health IT Functions diagram (Appendix B) is a starting place for discussions. Successful implementation of the necessary technical infrastructure must include multi-stakeholder evaluation of existing systems and technology currently under development. Appendix F Quality Measurement Technical Architecture details steps for assessing technical architecture capabilities to support quality measurement, as well as Federal Architecture and Medicaid Information Technical Architecture (MITA) context.

Electronic Health Record Data Sharing Readiness for Quality Measurement

Meeting the APM requirements demands new capabilities to generate actionable information for measurement activities. In this changing landscape, multiple stakeholders, including states, payers, and provider networks, are in need of rapid cycle measurement that can be used to guide a continuously improving health system.

Although an array of data sources will ultimately be used for these purposes, the widespread use of Electronic Health Record systems (EHRs) is an important source of patient-level information for multiple purposes including measurement of quality and health status. While harvesting EHR data for

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[9] Appendix B: Modular Health IT Functions Guide

measurement is logical, experience across the country has highlighted challenges to extracting and transmitting person-level data for measurement.

The challenges are complex and encompass business, technical, legal, and financial issues. In response, stakeholders are challenged with a decision on how to start using EHR data for measurement. Can providers generate measure results from each EHR system using a clear set of measure specifications (measure extraction strategy), or can providers extract person level data from each EHR system and transmit it for centralized aggregation and measurement (data extraction strategy)? Choosing between these strategies should involve a careful consideration of the advantages and limitations of each, and a careful examination of the stakeholders' readiness to work together for a successful result.

> **Extraction Approaches for CQMs**
> **Measure Extraction:** Each organization or provider site generates measure results (numerator, denominator) using their own EHR data and a set of measure specifications.
>
> **Data Extraction:** Patient level data is transmitted from each EHR to a centralized infrastructure where measure results are generated for all participant sites.

Appendix I Data Extraction Provider Readiness Improvement Tool provides a data sharing readiness assessment to help determine which circumstances favor patient-level data extraction with centralized measurement and which circumstances favor measure extraction from each EHR source. Given the complexity of the issues and the variation in readiness across settings, it is likely that a hybrid approach using a blend of data extraction and measure extraction will be needed.

Data Extraction or Measure Extraction Methodology

Data extraction or measurement extraction are two distinctly different approaches to using data from EHRs to generate clinical quality measurement. Benefits and limitations to each extraction approach including varying levels of provider engagement and readiness, as well as technical and measurement capability maturity need to be understood before either approach is selected.

A case study of the state of Arkansas' experience with conducting an assessment of provider readiness for data extraction is provided in Appendix J: Arkansas PCMH Survey: Practice Capacity to Extract, Report eCQM's. This guide also includes a template for how states can replicate such an assessment (see Appendix G Application of Data Extraction Principles). A glossary or "taxonomy" of the various topics and issues related to data extraction is provided in Appendix H, along with a tool in Appendix I for how stakeholders can begin to address those issues, "Data Extraction Provider Readiness Improvement Toolkit.

Sample of Data and Measure Extraction Considerations
- Can affected providers' EHRs effectively produce QRDA[10] reports?

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[10] **Quality Reporting Data Architecture** (QRDA) is a standard document format for the exchange of eCQMs. QRDA is used to exchange eCQM data between systems for quality measurement and is the data submission standards for a variety of quality measurement and reporting initiatives. 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 approaches for Stage 2 of Meaningful Use (MU2). Source: eCQI Resource Center "QRDA, What's the Quality Reporting Document Architecture (QRDA)?" https://ecqi.healthit.gov/qrda

- Should QRDA reporting directly from EHRs be considered if the EHRs in the state do not have the capacity to support QRDA?
- Should interim strategies be considered? For example, should a data extraction strategy of acquiring data via C-CDA[11] documents be pursued even though a portion of measures may not be satisfied with data in the C-CDA format?
- How should a data intermediary be used? Should that data intermediary accept available submissions in various formats (ADT, HL7, eRx, C-CDA) and then normalize that data into QRDA or other formats? This will require data quality programs and trust regarding the reliability of the data especially if using for payment purposes. This may be an iterative process to develop the capability, while developing the data reliability to get to more advanced uses of the information.

Extraction Decision Map

The following decision map can be used to assist planning and implementation for quality measure data sharing and extraction (Figure 2). This decision map is intended to help identify and respond to anticipated variability in readiness across stakeholder groups, and to assist with planning a phased approach where more motivated stakeholders participate early, with continued efforts to bring other stakeholders on over time. An application of the general decision guide is provided in Appendix G for planning health IT-enabled quality measurement can also be useful to considering whether to pursue measure extraction or data extraction.

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[11] **Consolidated-Clinical Document Architecture** (C-CDA) is another format available within EHRs to acquire and provide for a longitudinal view of patient's health information to provide a base standard for building electronic clinical documents. C**-CDA** includes additional data components that can support multiple functions. Continuity of care documents (CCDs) are typically used to shared formatted summary of care information and can be used for quality reporting. Using CCDs for quality measurement may require additional data quality efforts and manipulation for QRDA reporting. Source: ONC. "ONC Health IT Resource Center eCQM Affinity Group"

Figure 2 Decision Process

Assess providers shared interests and motivation
to pursue data extraction
(Q1 Business Case, Q2 Policy Levers)

Not Compelling | Compelling

Strategies to enhance shared interests, motivation, and governance structure, such as convening, facilitation, education, and policy levers that accelerate transition to APMs and learning systems

Strengthened →

Assess structure for shared decision making & leadership
(Q3 Governance)

Inadequate

Adequate

Strengthened →

Assess funding to support planning, technology, and services
(Q4 Funding Mechanisms)

Strategies to enhance funding including leveraging federal funding programs for planning and implementation

Strengthened

Adequate

Use measure extraction strategy for providers that are not ready for data extraction and centralized CQM

Strengthen provider readiness

Plan and implement data extraction strategy and centralized CQM for ready providers

Provider groups not ready

Framework for initially selecting data extraction or measure extraction based on readiness, with continued support for program wide transition to data extraction and centralized CQM

Data Aggregation for Quality Measurement

Aggregating data for quality measurement benefits multiple health care system stakeholders. Some data aggregation solutions serve multiple use cases, while others are narrower in their applicability. Aggregating data from multiple data sources can focus on claims-only data, clinical data (excluding claims), or integrate both data types to support multiple use cases and create higher value data sets for multiple stakeholders. Integrated aggregated data into a quality measurement strategy can support APM required aggregated measures, geographic-level measurement, benchmarking across organizations and providers, and total cost of care calculations. Population-level data[12] aggregation requires a trusted patient matching solution and attribution so measurement and analysis to the patient-level can be accomplished to provide more information and context on the quality of care and health outcome improvement.

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[12] Health Care Payer Payment Learning & Action Network "APM Data Sharing White Paper" http://hcp-lan.org/workproducts/ds-whitepaper-final.pdf

Data aggregation technical solutions should be considered when assessing data or measure extraction considerations. Data aggregation accuracy is dependent on correct identification of consumer information. Without a shared master patient index, measurement comparison and getting to patient-level data will not be possible as patients are seen at multiple providers and the patient data is captured in multiple EHRs. Accurate patient attribution and measurement will rely upon coordinated governance of data sources and patient

> **Data Level Definitions[13]**
>
> **Patient-level Data:** The entire range of diagnostic, clinical, utilization, experience of care, and patient-reported data attributed to a particular individual, irrespective of where the data was collected. Data stored in cyber-secure, HIPAA-compliant environment to address security and privacy concerns and can be reported in both patient-identified and de-identified views.
>
> **Population-level Data:** An aggregation of patient-level data, which is attributed to higher-level entities for reporting, such as plans, provider organizations, and patient populations in different geographic regions.

identifiers for comparison. Data aggregation solutions may also require the transformation of the data in addition to the aggregation of the data. According to the Health Care Learning & Action Network, "business arrangements and technical solutions for data aggregation will need to evolve and scale in a way that both permits a comprehensive view of a patient's health across payers, and are efficient for payers to participate in."[14] State case studies from Oregon, Michigan, and Vermont demonstrating different data extraction and aggregation solutions are provided in [Appendix K State Case Studies].[15]

Data Intermediary Services for Quality Measurement

Data intermediaries can provide shared, modular technical services, such as a common master patient index, to use for cross-organization/provider calculation and measurement. In addition, data intermediaries can provide all or some of the following functions: extraction of the data from the data source; normalization, scrubbing or cleaning of the data extracted; analysis of the available data to calculate quality, utilization, and cost measures, benchmarking, and formatting the analyzed data into the required document format (e.g., QRDA III/I) report.

Examples of data intermediaries for consideration include All Payers Claims Databases (APCDs,) Medicaid Meaningful Use EHR Incentive Program attestation State Level Registries, state or regional HIEs, clinical data registries or repositories, quality measurement systems supporting existing quality measurement reporting, such as PQRS or Quality Improvement Organizations, data warehouses, data aggregation of claims, and non-clinical data solutions. One of the limitations of APCDs is that less than a third of the states currently have an APCD in place or under development and only half of those allow de-identified patient information to be collected in the APCD. Additionally, APCDs typically contain only claims data (no clinical data) and may have statutory barriers in using the data beyond policy and research for operational purposes.

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[13] Health Care Payer Payment Learning & Action Network "APM Data Sharing White Paper" http://hcp-lan.org/workproducts/ds-whitepaper-final.pdf

[14] Health Care Learning & Action Network "APM Data Sharing Whitepaper" http://hcp-lan.org/workproducts/ds-whitepaper-final.pdf

[15] Appendix I Health IT-enabled Quality Measurement State Case Studies

Quality Measurement Roadmap Development

Demonstrating early wins and providing a roadmap to the desired state is critical to executing a strategy engaging multiple stakeholders, deliverables, timelines, and milestones. Quality measure execution roadmaps create a critical path for data senders and information users. A quality measure roadmap identifies achievable milestones over an agreed upon timeline enabling maturing data extraction capabilities, quality measure reporting requirements with increasing frequency, and improving units of measure. For example, the quality measure roadmap could require providers to report annually in electronic format at the provider aggregate level (numerator/denominator) in year one. In year two, the milestones could increase with reporting biannually in QRDA III aggregate format, and subsequent milestones advancing to receiving patient level quality measure data in potentially real-time for 100% of the empaneled patient population. An example quality measurement maturity model is provided in Figure 3.

Figure 3 Quality Measurement Roadmap Maturity Model Example

Quality Measure Execution Roadmap					
Current State					Desired State
Data Source and Measurement Method	HEDIS & Chart Review	Claims Only Data	Numerator Denominator	Independent Non-Claims Clinical Data	Cross-Organization Non-Claims Clinical Data	Integrated Clinical and Claims Data
Units of Measure	Payer	Organization	Practice	Provider	Patient	System or Population
Population Threshold	0% 10%	25%	50%	75%	100%
Data Source Format	Claims/X12	Numerator Denominator	C-CDA	Augmented data	Custom XML Queries	QRDA
Reporting Format	Numerator Denominator	QRDA Cat III				QRDA Cat I
Reporting Frequency	Annual	Quarterly	Monthly		Weekly	"Real-time"

Assessing the health IT capabilities and capacity to collect, report, share, and reuse quality measurement data for quality improvement and payment and deciding on the data extraction approach will inform the roadmap. Parallel implementation timelines can enable a glide path for collection of quality measures while data extraction and aggregation solutions are implemented.

Quality Measurement Feedback Tools

It is important to provide actionable feedback to the people who have an interest in quality measure results and will be using the results to guide ongoing improvement. Ideally, the feedback will allow stakeholders to view results of important measures at multiple levels as appropriate (e.g., practice site, community, region, program, or statewide). In addition, there should be sufficient drill down so that users can understand the factors that are driving their measure results. For example, if hospital admission rates are being compared across settings, then there should be additional results to highlight

the types of hospital admissions that are driving the result (medical, chronic conditions, surgical, mental health). In this way, care teams, quality teams, and other stakeholders can identify a focus for improvement. In another example, if HgbA1c > 9 is a core measure for an APM, then it is important to also display the drivers of near term costs for people with diabetes who have an HgbA1c > 9. While lowering HgbA1c below 9 can improve long term health outcomes, it may have no relationship to the near-term (12 month) cost goals of the APM. Near-term costs may be related to acute care for other co-morbid conditions, and it is important to address these cost drivers as well as HgbA1c.

It may be worthwhile to consider several forms of feedback to meet the needs of different stakeholders. For example, some stakeholders may prefer easily viewed summary reports (e.g. PDFs) that display comparative results of key measures, drivers, and change over time. Others may prefer a dynamic interface where they can sort and filter to create views that help drive their work. It is also important to determine how to share comparative measurement in a way that is acceptable to stakeholders while helping to meet health system goals. In some cases, site and provider level results may be shared openly across co-participants that share a financial interest in an APM. In other cases, site and provider level results may be de-identified for general, public reporting

To make feedback most useful, key stakeholders should help design the content, formats, and data sharing practices, so that the process is trusted and the information generated is most useful to meet the goals of APMs and a value-based health system. In addition, a process should be put in place for stakeholders to provide ongoing input for modification and updates to the feedback process. For additional resources, Agency for Healthcare Quality and Research (AHRQ) has evidence informed tools available.[16, 17] see Appendix L.

Quality Measurement Education and Technical Assistance

In addition to measurement and feedback, it is important to plan the support that should be in place to assist with ongoing improvement and eventually the use of measure results for learning health system[18] activities. Examples include training providers and support staff on formal approaches to data guided quality improvement, shared learning forums for scale and spread of best practices, and technical assistance to practices to improve the capture, availability, and quality of key data elements.

Quality Measurement Education

Practice settings, particularly those that don't have the administrative support of a larger organization, can benefit from training to help them put in place a structured approach to data-guided quality improvement. In addition to structured methods, it is essential to have an organized team dedicated to

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[16] http://www.ahrq.gov/professionals/clinicians-providers/resources/confidreportguide/index.html
[17] http://www.ahrq.gov/professionals/clinicians-providers/resources/privfeedbackgdrpt/index.html
[18] **Learning Health Care System** is "designed to generate and apply the best evidence for the collaborative healthcare choices of each patient and provider; to drive the process of discovery as a natural outgrowth of patient care; and to ensure innovation, quality, safety and value in health care. Advances in computing, information science and connectivity can improve patient-clinician communication, point-of-care guidance, the capture of experience, population surveillance, planning and evaluation and the generation of real-time knowledge—features of a continuously learning health care system." IOM (Institute of Medicine) 2013. Best care at lower costs: The path to continuously learning health care in America. Washington, DC: The National Academies of Press.

the process. In some programs, community-wide quality improvement training has been an integral part of patient-centered medical home and practice transformation programs, providing a solid foundation for data guided quality initiatives. In other settings, there will be a need to plan and implement this type of training. Consideration should be given to quality improvement capabilities at all levels (practice, community, region), as well as the need to strengthen these capabilities as comparative measurement is put in place.

Beyond the practice setting, attention should be given to shared learning forums that can help with scale and spread of best practices across settings. APMs facilitate a new business environment where traditionally segregated providers share common performance goals. As these models roll out, and comparative quality measurement takes hold, there is likely to be an accelerated interest in forums where providers can share best practices and improve overall population results. It may be necessary to assist providers and other stakeholders with planning and implementing structured learning forums at the community and regional level. National programs summarized in [Appendix A](#) identified quality improvement technical assistance programs available to providers and multi-stakeholder collaborations.

Data Quality Technical Assistance

Often overlooked is the need for direct technical assistance to practices to assist with data capture, quality, and availability from EHR systems. Health IT-enabled quality measurement is intended to support consistent and comparative measurement across settings. It is also intended to ultimately reduce the burden that providers experience with regards to measurement. Practice settings, particularly those without substantial administrative support, can benefit from expert assistance with workflow and strategies to routinely capture key data elements in a useful format, strategies to assure that the quality of demographic and clinical data is optimized, and strategies to assure that key data elements are reliably exported from EHR systems in a form that is useful for quality measurement. There may be a need for capable personnel to be dedicated to this process to realize the promise of health IT-enabled quality measurement including a reduction in measurement burden, and consistent measurement across settings, communities, and regions.

Financing Health IT-Enabled Quality Measurement

Developing quality measurement infrastructure and functions will take iterations to build services meeting statewide geography and multi-stakeholder needs. Coordinating quality measurement will require alignment on collection methods, data aggregation and analytic solutions, and potential use of common, shared services can support collaborative quality measurement technical capabilities. As common, shared services are identified, funding for the developing infrastructure must be considered for initial development, as well as ongoing technical sustainability.

Across the country, there are multiple examples of shared, cost-allocated funding for development and implementation of reusable health IT infrastructure and functions. The following examples are not all specific to quality measurement but can be used as examples of collaborative financing for shared health IT infrastructure and functionality.

Health IT Functions Financing Example #1 - Medicaid funding is available for Medicaid's fair-share portion of the design, development, and implementation (DDI) of the shared, reusable infrastructure and other technical services. The investment must meet Medicaid requirements for advancing Meaningful Use Incentive Program, cost-allocation, and DDI of a reusable, modular exchange of health information architecture. Medicaid matching funds under HITECH/HIE are allowed until 2021 but do not support maintenance and operations of the modular system. A list of Medicaid funding options is noted below with corresponding State Medicaid Director letter (SMD) as references.

- SMD Letter #09-006[19]
- SMD Letter #10-016[20]
- SMD Letter #11-004[21]
- SMD Letter16-003[22]

Health IT Functions Financing Example #2 The multi-payer network of public & private health care payers in Colorado focused on strengthening primary care convened as part of Comprehensive Primary Care Initiative (CPCI) Classic and Plus, and evolving to support SIM.[23] The collaboration created a framework for monthly meetings, aligned clinical quality measures for CPCI and SIM, and partnered on a shared, data aggregation technology solution procurement and selection process. Each commercial payer, including Medicare, has individual contracts with the data aggregation solution vendor to submit claims data for cross-payer utilization and total cost of care measurement to 75 practices (CPCI Classic). Additionally, the multi-payer collaborative shared CPC practice site visits to drive data aggregator and feedback report use. Each member of the multi-payer collaborative provided funding for the shared data aggregation solution.
Future development: An ACO in the state decided to use the same vendor data aggregation solution vendor for performance and clinical quality measurement. The collaborative intends to use clinical data for quality measurement.

Health IT Functions Financing Example #3 Oregon identified alert notifications solution as a priority in the HITECH/HIE Implementation Advanced Planning Document (IAPD), with the intention of launching it for Medicaid and then figuring out how to extend it to other populations and payers. In the meantime, the state of Washington was implementing Emergency Department Information Exchange (EDIE), specifically focused on notification of ED visits. In Oregon, the OHLC (Oregon Health leadership Council) and/or the HIT Oversight Council (HITOC) reviewed EDIE's capabilities and determined it could serve Oregon's alert notification needs.

State Response: Oregon's Office of HIT (OHIT) chose to try to accommodate the preference for the EDIE vendor while honoring state procurement policies. They determined that while the state could not sole source a product like EDIE, Medicaid could participate in an existing solution for the

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[19] https://www.cms.gov/Regulations-and-Guidance/Legislation/Recovery/downloads/SMD090109_with_6attachments.pdf
[20] CMS "https://www.medicaid.gov/federal-policy-guidance/downloads/smd10016.pdf
[21] https://downloads.cms.gov/cmsgov/archived-downloads/SMDL/downloads/SMD11004.pdf
[22] https://www.medicaid.gov/federal-policy-guidance/downloads/SMD16003.pdf
[23] https://www.lansummit.org/wp-content/uploads/sites/8/2015/09/4C-00Total.pdf

Medicaid population. That approach was analogous to participating in an existing HIE by paying Medicaid's fair share. OHIT was able to negotiate a fair share participation for the benefit of Medicaid providers and members and to acquire a seat on the governing committee for EDIE. EDIE is a subscription model based on size. All Oregon hospitals have signed up.

Subsequent Expansion: EDIE Plus adds hospital admissions and discharges to the list of alert situations. An EDIE Plus Utility adds analysis and planning/coordination based on patient profiles and the history of ED and hospital visits. Many provider organizations have subscribed to the EDIE.

Quality Measurement Reporting and Improved Outcomes Incentives

APMs start the transition to performance-based incentive payments by rewarding how well a practice performs on patient experience, clinical quality, and utilization measures that drive total cost of care. Incentives can be awarded for reporting or for improved health outcomes and other indicators of progress. Incentives can initially be applied specifically to health IT policies or infrastructure, with a transition plan to move from reporting capability to improved outcomes.

Policy Levers for Quality Measurement

Policy levers are available to advance measure alignment, data collection, standards, data aggregation, and reporting systems. Policy levers related to quality measures, technology requirements, reporting standards, etc., include state legislation, state regulation and statewide policies (e.g. Medicaid, State Employees, public health, Medical Boards), contractual requirements, and financial incentives. The [ONC HIT Resource Center State Health IT Policy Lever Compendium](#) is a reference tool for policy examples related to quality measure governance, technology, and measures.

Looking Forward

This guide provides tools for the state to consider when moving forward on quality measurement and performance based value purchasing strategies. Quality measurement based on accurate, reliable, accessible digitized data efficiently and effectively obtained through standardized, shared health IT is critical for aligned multi-payer value purchasing implementation and operations. Success is dependent on cooperative strategic planning and coordinated execution of the operational strategies provided within the guide. ONC Health IT Resource Center technical assistance is available for SIM states.

Appendices

Appendix A: National Programs Requiring or Related to Quality Measurement

Program	Description
State Innovation Models Initiative (SIM)	The **State Innovation Models (SIM)** Initiative is providing financial and technical support to states for the development and testing of state-led, multi-payer health care payment and service delivery models that will improve health system performance, increase quality of care, and decrease costs for Medicare, Medicaid and Children's Health Insurance Program (CHIP) beneficiaries—and for all residents of participating states.[24]
Quality Payment Program (QPP)	Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) created the **Quality Payment Program**, which supports a new approach to paying clinicians for value and quality of care they provide.[25] The Quality Payment Program streamlines multiple quality programs under the new Merit-Based Incentive Payments System (MIPS) and provides bonus payments to practitioners for participation in eligible alternative payments models (APMs). • Merit-based Incentive Payment System (MIPS) - The Merit-based Incentive Payment System (MIPS) ties Medicare payments to clinicians for providing high quality, efficient care through four performance categories: Cost, Quality, Clinical Practice Improvement Activities, and Advancing Care Information. • Alternative Payment Models (APMs) - An APM is a payment approach that gives added incentive payments to provide high-quality and cost-efficient care. APMs can apply to a specific clinical condition, a care episode, or a population. • Advanced APMs are a subset of APMs, and let practices earn more for taking on some risk related to their patients' outcomes. Clinicians may earn a 5% incentive payment by going further in improving patient care and taking on risk through an Advanced APM.[26]
Transforming Clinical Practice Initiative (TCPI[27])	The **Transforming Clinical Practice Initiative** is designed to help clinicians achieve large-scale health transformation by supporting more than 140,000 clinician practices over the next four years in sharing, adapting and further developing their comprehensive quality improvement strategies. The initiative is one part of a strategy advanced by the Affordable Care Act to strengthen the quality of patient care and spend health care dollars more wisely. It aligns with the criteria for innovative models set forth in the Affordable Care Act: • Promoting broad payment and practice reform in primary care and specialty care, • Promoting care coordination between providers of services and suppliers, • Establishing community-based health teams to support chronic care management, and • Promoting improved quality and reduced cost by developing a collaborative of institutions that support practice transformation.

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[24] Center for Medicare and Medicaid Services " State Innovation Models Initiative: General Information" https://innovation.cms.gov/initiatives/state-innovations/
[25] Centers for Medicare & Medicaid Services. Final Rule with Comment Period. "Medicare Program; Merit-Based Incentive Payment System (MIPS) and Alternative Payment Model (APM) Incentive Under the Physician Fee Schedule, and Criteria for Physician-Focused Payment Models." https://www.federalregister.gov/documents/2016/11/04/2016-25240/medicare-program-merit-based-incentive-payment-system-mips-and-alternative-payment-model-apm.
[26] CMS Quality Payment Program website: https://qpp.cms.gov/learn/apms
[27] Center for Medicare and Medicaid Services. "Transforming Clinical Practice Initiative" https://innovation.cms.gov/initiatives/Transforming-Clinical-Practices/ September 2016

Program	Description
EvidenceNOW[28]	**EvidenceNOW** is an AHRQ grant initiative dedicated to helping small- and medium-sized primary care practices across the country use the latest evidence to improve the heart health of millions of Americans. This initiative aligns with the U.S. Department of Health and Human Services Million Hearts®, a national effort to prevent 1 million heart attacks and strokes by 2017. The seven cooperatives have developed unique interventions designed to improve health care delivery. • On-site practice facilitation and coaching • Health information technology support • Shared learning collaboratives • Expert consultation • Data feedback and benchmarking
Health Care Learning & Action Network	To achieve the goal of better care, smarter spending, and healthier people, the U.S. health care system must substantially reform its payment structure to incentivize quality, health outcomes, and value over volume. Such alignment requires a fundamental change in how health care is organized and delivered and requires the participation of the entire health care ecosystem including partnership with other sectors. The Health Care Payment Learning & Action Network (LAN) was established as a collaborative network of public and private stakeholders, including health plans, providers, patients, employers, consumers, states, federal agencies, and other partners within the health care ecosystem. By making a commitment to changing payment models, establishing a common framework, aligning approaches to payment innovation, sharing information about successful models, and encouraging use of best practices, the LAN can help reduce barriers and accelerate the adoption of APMs.[29]
Qualified Entity Program	The CMS Qualified Entity (QE) Program (also known as the Medicare Data Sharing for Performance Measurement Program) enables organizations to receive Medicare claims data under Parts A, B, and D for use in evaluating provider performance. Organizations approved as QEs are required to use the Medicare data to produce and publicly disseminate CMS-approved reports on provider performance. QEs are also permitted to create non-public analyses and provide or sell such analyses to authorized users. In addition, QEs may provide or sell combined data, or provide Medicare claims data alone at no cost, to certain authorized users. Under the Qualified Entity Certification Program (QECP), CMS certifies QEs to receive these data and monitors certified QEs. Understanding the Qualified Entity Program is highly relevant to multiple aspects of those engaging in Health IT-enabled Quality Measurement. https://www.cms.gov/Research-Statistics-Data-and-Systems/Monitoring-Programs/QEMedicareData/index.html

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[28] Agency for Healthcare Research and Quality. "Evidence Now" http://www.ahrq.gov/evidencenow/about/index.html
[29] Health Care Learning & Action Network https://hcp-lan.org/about-us/

Preparing for Quality Payment Program (QPP)

Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) created the **Quality Payment Program**, which supports a new approach to paying clinicians for value and quality of care they provide.[30] The following provides an approach to understanding key aspects of the program related to Health IT-enabled Quality Measurement Strategy and incorporating them into multi-stakeholder strategy development.

1. Utilize All Resources Available

Quality Payment Program Website (https://qpp.cms.gov/) - The first step for most will be to visit the CMS website for the Quality Payment Program, which includes clear, high-level overview information targeted at providers. We encourage those leading the development of HIT-enabled quality measurement strategy to use and share the site with all stakeholders.

Quality Payment Program Fact Sheet (https://qpp.cms.gov/docs/Quality_Payment_Program_Overview_Fact_Sheet.pdf)

Quality Payment Program Final Rule with Comment Period (https://www.federalregister.gov/documents/2016/11/04/2016-25240/medicare-program-merit-based-incentive-payment-system-mips-and-alternative-payment-model-apm) – The final rule includes all details about the program, including information about expected impact on participants, responses to stakeholder comments, and a useful executive summary.

Technical Assistance Resources - $100 million in technical assistance will be available to MIPS eligible clinicians in small practices, rural areas, and practices located in geographic health professional shortage areas, including IHS, tribal, and urban Indian clinics, through contracts with quality improvement organizations, regional health collaborates and others. (https://qpp.cms.gov/docs/QPP_Where_to_Go_for_Help.pdf)

2. Develop Familiarity with Overall Aspects of MIPS and APMs

The Quality Payment Program streamlines multiple quality programs under the new Merit-Based Incentive Payments System (MIPS) and provides bonus payments to practitioners for participation in eligible alternative payments models (APMs).

- Merit-based Incentive Payment System (MIPS) **-** The Merit-based Incentive Payment System (MIPS) ties Medicare payments to clinicians for providing high quality, efficient care through four performance categories: Cost, Quality, Clinical Practice Improvement Activities, and Advancing Care Information.
- Alternative Payment Models (APMs) **-** An APM is a payment approach that gives added incentive payments to provide high-quality and cost-efficient care. APMs can apply to a specific clinical condition, a care episode, or a population.
- Advanced APMs are a subset of APMs, and let practices earn more for taking on some risk related to their patients' outcomes. Clinicians may earn a 5% incentive payment by going further in improving patient care and taking on risk through an Advanced APM.[31]

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[30] Centers for Medicare & Medicaid Services. Final Rule with Comment Period. "Medicare Program; Merit-Based Incentive Payment System (MIPS) and Alternative Payment Model (APM) Incentive Under the Physician Fee Schedule, and Criteria for Physician-Focused Payment Models." https://www.federalregister.gov/documents/2016/11/04/2016-25240/medicare-program-merit-based-incentive-payment-system-mips-and-alternative-payment-model-apm.

[31] CMS Quality Payment Program website: https://qpp.cms.gov/learn/apms

3. Understand Reporting and Feedback Aspects of the Rule

Third Party Intermediaries – The final rule creates "requirements for third party data submission to MIPS that are intended to decrease burden to individual clinicians. Specifically, qualified registries, Qualified Clinical Data Registries (QCDRs), health IT vendors, and CMS-approved survey vendors will have the ability to act as intermediaries on behalf of MIPS eligible clinicians and groups for submission of data to CMS across the quality, improvement activities, and advancing care information performance categories."[32] The final rule includes a key section on Third Party Data Submission, and that includes the criteria that must be met to be approved by CMS as a third party intermediary.[33] Additional resources can be found at the Quality Payment Program resources education site, https://qpp.cms.gov/education, including a fact sheet on self-nomination for QCDRs and qualified registries.

Performance Feedback – The final rule creates a process for providing performance feedback to MIPS eligible clinicians via a web-based application. The rule also finalizes the CMS proposal to leverage additional mechanisms such as health IT vendors and registries to help disseminate data contained in the performance feedback to MIPS eligible clinicians where applicable.[34] Stakeholders should be familiar with the detailed sections of the rule on "Feedback and Information to Improve Performance."[35] A Health IT-enabled Quality Measurement strategy should consider how to align with or leverage the activities of such vendors and registries.

4. Know Relevant Health IT Aspects of the Rule

Advancing Care Information & Clinical Practice Improvement Activities – The Quality Payment Program made changes for Medicare eligible professionals currently eligible for the Medicare EHR Incentive Program, also known as "Meaningful Use." The Advancing Care Information category under MIPS replaces the Medicare EHR Incentive Program for Medicare physicians. ACI requires MIPS providers that do not have an exclusion to fulfill certain measures that are relevant to entities engaging in the enterprise of Health IT-enabled Quality Measurement, including sending summary of care records. There are also aspects of the Clinical Practice Improvement Activities that are relevant. For example, for the transition year of 2017, CMS will award a bonus score for improvement activities that utilize CEHRT and for reporting to public health or clinical data registries.[36]

Information Blocking Attestation – MACRA crated the requirement that to be a meaningful EHR users, an EP must demonstrate that he or she has not knowingly and willfully taken action (such as to disable functionality) to limit or restrict the compatibility or interoperability of certified EHR technology. The Quality Payment Program rule thus requires that providers make attestations related to health information exchange and information blocking.[37] These requirements are relevant to data extraction and other aspects of Health IT-enabled Quality Measurement.

Supporting Health Care Providers with the Performance of Certified EHR Technology – The Quality Payment Program included an attestation requirement that an eligible physician, eligible hospital, or critical assess hospital to attest that they acknowledge the requirement to cooperate in good faith with ONC direct review of their health information technology certified under ONC.[38] This and the related requirements would be relevant to stakeholders engaging in Health IT-enabled Quality Measurement.

[32] https://www.federalregister.gov/d/2016-25240/p-176
[33] https://www.federalregister.gov/d/2016-25240/p-4280
[34] https://www.federalregister.gov/d/2016-25240/p-174
[35] https://www.federalregister.gov/d/2016-25240/p-4012
[36] https://www.federalregister.gov/d/2016-25240/p-168
[37] https://www.federalregister.gov/d/2016-25240/p-288
[38] https://www.federalregister.gov/d/2016-25240/p-285

Appendix B: Modular Health IT Functions Guide
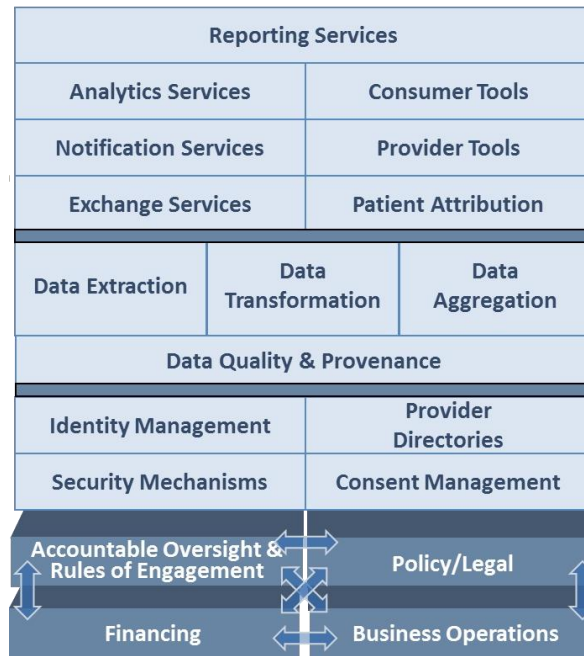
Figure 4 Modular Health IT Functions

Health IT Modular Functions	Descriptions and Examples
	Foundational Components
Accountability, Oversight & Rules of Engagement (a.k.a., Governance)	Multi-stakeholder wide framework which may include state, federal, private entities for managing information throughout its lifecycle and supporting a collective, multi-stakeholder strategy, operations, regulatory, legal, risk, and environmental requirements.[39] Whether undertaken by a government, market or network, or over formal or informal organizations and whether through the laws, norms, power or language, AO&RoE is of all processes of governing"[40] **Examples**: enabling legislation, empowered advisory councils, senior executive authority, and multi-payer collaborative ***Note:*** State government has a unique governing role that is separate from and in addition to the framework discussed above. This is separate from national governance activities, such as CareQuality/Commonwell.

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[39] AHIMA. "Information Governance Principles for Healthcare (IGPHC)" http://www.ahima.org/topics/infogovernance
[40] Bevir, Mark (2013). Governance: A very short introduction. Oxford, UK: Oxford University Press.

Health IT Modular Functions	Descriptions and Examples
Policy/Legal	Policy and legal parameters that apply to everyone. Policy may include health IT policy levers defined as any form of incentive, penalty, or mandate used to effectuate change in support of health IT adoption, use, or interoperability[41]. State level policy may include state laws, state regulations, state funding, and state programs (including Medicaid activities and health care programs beyond Medicaid) that direct the spending of state money to advance and sustain technical investments, ensure secure exchange and use of health information, and establish required criteria for technology infrastructure. **Examples**: Legislation; regulations authorized by legislation; Medical Board policies; Medicaid policies; policies for program implementation; creation of data use agreements; vendor agreements, etc.
Financing	Funding mechanisms for Health IT. Financing includes financing sources, who is funding what, and how things will be paid for initially and ongoing. Health IT for Medicaid programs and for Medicaid participation in multi-payer programs and use cases should be funded through IAPDs. May include fees or subscriptions authorized by legislation or regulations. Financing may vary by module. Decisions on funding often dictate the rules of engagement and may affect the scope of participation.
Business Operations	Business Operations represents the collection of agreements, practices, and processes that support the operation of the modular functions to their desired use and outcomes. Business Operations are established to support the compelling business case, and modified as new use cases are added. Business Operations specific to Data Management address data and data services - extending to the procedures that guide the movement and storage of data, including privacy and security, and data use and sharing agreements. For data, Business Operations answer the questions - where does it come from, what is to be done with it, where does it go or reside? **Examples**: Medicaid and/or State Employee contracting processes and procurement requirements; execution of vendor agreements and data use agreements, and implementation of data management practices and procedures
Core Infrastructure	
Security Mechanisms	Mechanisms ensuring that electronic health information can be shared in a secure and private manner and not altered in an unauthorized or unintended way, while still making the information available when needed to those authorized to access it. Ensure that health IT is developed and deployed securely. **Examples**: Identity proofing, access, authentication, and authorization

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[41] State HIT Policy Levers Compendium https://www.healthit.gov/policy-researchers-implementers/health-it-legislation-and-regulations/state-hit-policy-levers-compendium

Health IT Modular Functions	Descriptions and Examples
Consent Management	A system, process, or set of policies that enables patients to choose what health information they are willing to permit their healthcare providers to access and share. Consent management addresses participation in electronic health initiatives such as patient portals, personal health records (PHR), and health information exchange (HIE). States face two key consent management issues: Basic Choice/Granular Choice[42] (including opt-in vs. opt-out[43]), and challenges related to federal regulations on the Confidentiality of Substance Use Disorder Patient Records (42 CFR Part 2)[44.]
Identity Management	Certain related functionalities, processes, and policies for the broad concept of master data management defined as the "comprehensive method of enabling an enterprise to link all of its critical data to one file, called a master file, which provides a common point of reference."[45] Identity Management can be described through its two major components: 1) Identity Proofing is the process of verifying that a person is who they claim to be and establishing a reliable relationship that can be trusted electronically between the individual and said credential for purposes of electronic authentication; and 2) electronic authentication is the process of establishing confidence in user identities electronically presented to an information system[46] Identity management can support authentication of provider records validating the correct facility, provider, or clinician data and appropriate access to information. Patient identity management may focus on "patient" matching, which is only one component of many identity management functions. "Patient matching" can be executed as part of a system commonly called a Master Patient Index (MPI).[4748]

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[42] Basic Choice is the choice offered to an individual to prevent his/her PHI from being available for electronic exchange when it otherwise would be for purposes of TPO (without an individual's permission) because it is allowed by the HIPAA Privacy Rule, and no other laws requiring permission such as 42 CFR Part 2, or state enacted laws, apply. Granular Choice is the choice an individual makes regarding the distinctions between legally sensitive clinical conditions, such as mental health or HIV/AIDS status and evolves over time to enable choice about disclosure to specifically identified participants in the health care system.

[43] On the topic of opt-in vs. opt-out, providers may choose to offer one or a combination of the following general types of consent policies: opt-in – default is that patient health information is not shared, and patients must actively express their consent to share; opt-out – default is for patient health information to automatically be available for sharing. Patients must actively express their desire to not have information shared if they wish to prevent sharing (https://www.healthit.gov/providers-professionals/meaningful-consent-overview). HHS/ONC has not set out specific steps or requirements for obtaining a patient's choice whether to participate in electronic health information exchange (eHIE) (https://www.healthit.gov/providers-professionals/patient-consent-electronic-health-information-exchange/health-information-privacy-law-policy). However, adequately informing patients of these new models for exchange and giving them the choice whether to participate is one means of ensuring that patients trust these systems. States are therefore encouraged to enable patients to make a "meaningful" consent choice rather than an uninformed one. The Interoperability Roadmap's supplemental materials state that "Electronic health information available for a learning health system may be inadequate if insufficient people "opt in" or may be skewed by the demographics of the individuals who do opt in vs. those who do not opt in."

[44] The Substance Abuse and Mental Health Services Administration (SAMHSA) published a proposed rule on this regulation on February 9, 2016. https://www.federalregister.gov/documents/2016/02/09/2016-01841/confidentiality-of-substance-use-disorder-patient-records
[45] https://en.wikipedia.org/wiki/Master_data_management
[46] https://www.healthit.gov/sites/default/files/identitymanagementfinal.pdf
[47] https://www.healthit.gov/sites/default/files/master_data_management_final.pdf
[48] https://www.healthit.gov/sites/default/files/patient_identification_matching_final_report.pdf

Health IT Modular Functions	Descriptions and Examples
Provider Directories	A health provider directory supports management of healthcare provider information, both individual and organizational, in a directory structure. **Examples:** Information about the provider (Demographics, physical addresses, credential and specialty information, as well as electronic endpoint to facilitate trusted communications with a provider); information about the provider's relationships: (Affiliation with other organizations and providers; Health Information Exchange (HIE) and members; Integrated Delivery Networks and care delivery members; Hospitals and their practitioners; Hospital sub-organizations including departments, physician Practice Groups and their practitioners, practitioners and the hospitals they are associated with).
ETL Functions
Data Quality & Provenance	Business processes and/or technical solutions ensuring the integrity of an organization's data during collection, application (including aggregation), warehousing, and analysis. Processes to improve the quality of data may include on-site practice transformation technical assistance and use of data quality provider feedback tools. Data Provenance in the context of health IT refers to evidence and attributes describing the origin of health information (the data source) as it is captured in a health system. [49] Data provenance examples: - Provides the ability to trace and verify the creation of information, - How it has been used or moved among different databases, - How it is altered throughout its lifecycle.
Data Extraction	The activity and considerations related to harvesting data from its sources. Data extraction is a key component for interoperability of health information for closing care gaps, monitoring patient's health, measuring performance, and exchanging information. **Examples**: HL7 messaging integration, Direct database interface (reverse engineering); certified functions for data exchange and measurement
Data Transformation	Data transformation converts a set of data values from the data format of a source data system into the data format of a destination data system."[50] There can be multiple steps involve in this, including data mapping, code generation,[51] and data normalization to reduce data redundancy and improve data integrity."[52]

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[49] S&I Framework Data Provenance Initiative http://wiki.siframework.org/Data+Provenance+Initiative
[50] https://en.wikipedia.org/wiki/Data_transformation
[51] Ibid.
[52] https://en.wikipedia.org/wiki/Database_normalization

Health IT Modular Functions	Descriptions and Examples
Data Aggregation	Data aggregation collects and aggregates data for various uses into one or more data stores to support a variety of use cases. Data aggregation solutions may transform the data in addition to aggregating. Data aggregation for value based payment models supports cross provider and payer data amalgamation for analytics and population health measurement, among other uses. Some data aggregation solutions serve multiple uses, while others are designed for specific uses. **Examples**: Clinical Data Repository for health information exchange, Integrated clinical and non-clinical data for value-based payments, data warehouses or registries for disease or topic specific measurement (e.g., BMI registry)
Health IT Technical Functions	
Reporting Services	Services that produce reports from data sources in desired formats for display and possible interaction. Reports can be generated in a variety of formats (spreadsheets; PDFs; word processing files) but are more commonly made available through a portal for viewing or downloading by the intended user. **Examples:** an MCO reporting to a provider, a provider to a consumer or a payer, a state to a provider, provider to state, provider to federal agency, etc.
Analytics Services	Services that take in data and use that to create new knowledge based on analysis, usually using statistical methods. Analytics services perform data analytics capabilities and can work in conjunction with reporting services by reporting out the analytical developed information in reporting formats. Probably requires software tools that are more sophisticated than typical reporting tools, and may require skilled users (statisticians, informaticists) to interpret the data and the results, and to generate the report.
Notification Services	A class of services that act on status messages, or on a status change flag, to either forward a message or create an appropriate message from the content received, with distribution based on a rule set to determine who gets what message. Event notifications (e.g., ADT "alerts") are one instance of notification services, ideally combined with analytics services and filtering capabilities to allow for customized alerts notifying targeted users of specific information related to an event. **Examples**: ADT "alerts" notifying care team of ER visit or hospital admission/discharge; event notifications of other services, including services that impact health as well as notification of use of need for a health care service. Potentially a notification could be linked to authorization.
Exchange Services	Exchange services acquire, process, and exchange health data across disparate data sources and destinations. Services can be performed by a health information exchange entity or the technical platform/solution. Query-based exchange services are automated-and can include "pulled" or "pushed" information. **Examples:** Transporting data from a message; auto-forwarding an immunization message to a public health registry; acting as a Direct HISP, or query based exchange.

Health IT Modular Functions	Descriptions and Examples
Consumer Tools	This is a category of services available to consumers to view and manage their health information or information about themselves. An example of the former is accessing lab results. An example of the latter is choosing preferences in a consent registry for sharing their health information. **Examples**: patient education, engagement and access tools – not just patient portals. Mobile health applications.
Provider Tools	Like consumer tools, provider tools can provide information about or related to patients, such as longitudinal clinical results, but can also allow a provider to manage provider information, or other information of importance to the provider, in a provider registry or other application. **Examples**: Dashboards, feedback reports, informed decision making tools, provider education portals, Provider education, engagement and access tools. Mobile health applications. Quality Measure Feedback portals, feedback reports sent into EHRs to be used in cooperation with quality improvement technical assistance
Patient Attribution	A process or function for matching patients to providers for purposes of care delivery and/or alternative payment models. Rules-based algorithms are employed to follow a general prospective or retrospective approach. This is likely done by payers of all types but will require the functionality of a master person index and a provider directory to accomplish. Systems that allow for proper retrospective and prospective attribution of patients to providers for assigning cost and quality accountability under new payment models and to allow providers to know who they are responsible for delivering care, which must be prospective .

Appendix C: Quality Measurement Value Propositions

Alternative payment models and accountable care create a need for new longitudinal measures of quality and health outcomes across settings of care. This will require health IT solutions beyond EHRs and core data curation services that can reliably manage identity, aggregate data, improve data quality, establish attribution, create extracts for users, report measures, and provide actionable feedback to providers in a rapid cycle fashion.[53] The following list identifies added value for different stakeholders participating in a multi-stakeholder health IT-enabled quality measurement environment.

Stakeholder	Value Proposition
Patient/ Individual/ Public	• Assemble a more complete and accurate patient record across a region • More complete data supports more reliable measurement in the interests of citizens • Uses include coordination of services, quality initiatives, and comparative evaluation • Comparative Information helps with selection of providers that offer better quality & costs • Comparative information supports more informed purchasing of services • Data informed health system offers better value for individuals, families, and businesses
Providers/ Practices/ Hospitals	• Collect data once and reuse for clinical quality measurement and care delivery needs • Supply data once in native formats from existing systems, reduce cost and technical complexity • Reduce quality measure reporting burden • Access to timely actionable feedback based on more complete and accurate data • Provides insights and helps to identify impactable cohorts for population management • Comparative evaluation to identify variation & improve performance • Reward providers for lower costs and better outcomes • Present a clear pathway to value, as a meaningful scorecard on performance • Realize valid, reliable and accurate patient outcome measures that support risk-adjustment analysis and are comparable across settings and payers[54]
Payers	• Supports consistent attribution, data quality, and measurement across payers • Provides payers with more complete data for internal use • Regional services can reduce payers redundant administrative costs associated with data collection, data management, data quality, measure generation, and feedback to providers • Supports participation in value based payment models (better outcomes, lower cost) • Provides valid, reliable and accurate patient outcome measures that support risk-adjustment analysis and are comparable across settings and payers[55]
State/Federal agencies	• Reuses collected data for measurement and oversight in the interests of citizens • Consistent reliable performance measurement for participation in APMs • Data informed policy and regulation for ongoing progress to a value based health system
Research	• Efficient reuse of population data for research related to important use cases including program impact, comparative performance and variation analyses, and predictive models for proactive outreach to impactable populations • Accelerates use of routinely collected data to inform learning system activities, identification of best practices, and updates to standards and guidelines[56]

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[53] https://www.healthit.gov/sites/default/files/HITEnabledQualityImprovement-111214.pdf
[54] Ibid
[55] Ibid
[56] http://blueprintforhealth.vermont.gov/reports_and_analytics

Appendix D: Assessing Quality Measurement Capability

Coordinating health IT-enabled quality measurement involves convening the appropriate stakeholders to collaborate and coordinate strategy and execution strategies. The following steps outline the building blocks for multi-stakeholder engagement needed to implement quality measurement for APMs.

1. Identify willing and influential senior leadership across participating payers (including Medicaid) to participate in a governance process.
2. Establish a governance process with a trusted facilitator, all payers and other key stakeholders represented to
   - » Agree on core measure set for specific initiative and
   - » Shared data infrastructure for collection, reporting and feedback on performance.
3. Create guiding documents, i.e., MOU or charter to establish roles, responsibilities and accountability.
4. Identify barriers and stakeholder concerns and develop business processes to work through barriers.
5. Identify priority use cases, measures, financing and pilot for initial data infrastructure. As necessary, identify and plan for a group RFP process that ensures multi-stakeholder input, including Medicaid.
6. Evaluate, iterate and implement to broader number of providers and using full set of measures.

Each step has specific questions needed to assess the current and needed capabilities noted in the following table.

Assessments	Questions to consider
Purchasing and Measurement Alignment	• Alignment - Is there agreement on the definition of "alignment? Does alignment equate to operationally the same or similar, or conceptually the same but operationally different? 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. • Purchasing alignment - Is there a common public or private program or purchasing approach to use? • Measure alignment – Is there agreement to use the same quality measures and value sets across settings and within multiple programs when possible? • Macro alignment – Are there common measures to start building capabilities to pave the road for more measures (e.g., NQF 0018 – the Million Hearts Hypertension measure)? • Micro alignment - Is there agreement on the data source, the means of data extraction and transport, and the actual data specifications? How close are data specifications aligned to "gold standard" specifications? What accommodations need to exist for different populations (e.g., Primary Care, Pediatrics, Mental Health, and Substance Use) and different providers (e.g., BH, LTSS, and providers that impact health)? Is there agreement on what is meant by "de-identified data"? Does "de –identified" mean at output or at input?
Perceived barriers	• What are the perceived and actual barriers? Are they known? • Which are critical to "success"?

Assessments	Questions to consider
Quality Measurement and HIT Accountability, Oversight & Rules of Engagement	• Is there a current data governance structure and does it support quality measurement? • Is there a current health IT accountability, oversight and rules of engagement model and does it support quality measurement? • Who are the key public and private stakeholders that are needed to support quality measurement and the specific priority use cases under consideration? • What workgroups need to be created or leveraged to support measure alignment, technical details, and alignment to broader health reform priorities and strategies?
Value Proposition	• Is there a business case at the individual entity level, not just in the aggregate? • Is there a value proposition for providers, payers and the state to work together in a unified approach?
Trust Process	• What is the actual level of commitment of engaged participants, including schedule, named people who will participate, and financial commitments? • Is there agreement on who needs to be in which discussions? If executive leadership with decision making authority is not at the table, is a decision a sustainable decision?
Priority Use Cases	• What are current and future priority use cases? • What is the value proposition for all stakeholder groups? (payers, purchasers, providers, patients) for each specific priority use case? • What are the measurement and heath IT barriers and needs for each stakeholder group? • Are there sufficient common objectives and benefits to move from conceptual agreement to implementation, with stakeholders motivated to adopt a set of measures and related data and health IT infrastructure? Will implementation be through, FFS, PCMHs, MCOs, ACOs, or other APMs? Can the measurement approach accommodate all payment models and a potential transition from one to another?
Measurement and Data Current and Future	• How is the state currently assessing quality, including total cost of care, utilization and clinical quality? • Does the state have a statewide quality measure structure and if so for what type of measures? • Is there a quality measure network at regional or local levels (not statewide) and if so for which measures? • Will these measures meet the current and future priority use case needs? If not, where are the gaps (e.g., total cost of care, transitions of care, providers of services that impact health, health outcomes)? • Where are the data to create the measures for the current and future priority use cases? (e.g. EHR, claims, practice management system, registry, state PH or other systems) • What additions or enhancements need to be made to the current data or CQM measures and development processes? (e.g. inclusion of other provider types, alignment with national measures)

Assessments	Questions to consider
Health IT Architecture and Functionalities (Current and Future State)	• Does the state currently have statewide health IT capabilities and operational capacity to support quality measurement and if so for which measure types and measures? (e.g. HIE, data intermediaries, state quality systems) • Are there current health IT capabilities and operational capacity at regional or local levels (not statewide) and if so for which measures? (e.g. data intermediaries, HIEs) Are there opportunities to identify common, shared services? • Is there schedule alignment between the CQM technologies in development and anticipated "go live" dates for measure availability? • Will the health IT currently in place or under development meet the immediate and future priority use case needs? If not, where are the gaps (e.g. quality reporting systems, electronic data sources, interfaces to data sources, ability to extract necessary data, ability to securely transport identified data, data quality, data repository/warehouse/mart? • Is there a business case for addressing the gaps through shared technical services (e.g., Identity Management, Quality Reporting, Provider Directories, Attribution)[57] • Is there a data dictionary for common terminology? Do you need to address definitions? • Do workgroups need to be created or leveraged? • Is there agreement for alignment across programs? Across payers?
Data Collection Methods	• Alignment on collection methods? (pooling data across payers) • Inclusion and role of data aggregator and/or intermediary? (examples- APCD, multi-stakeholder HIO, private HIO, regional health collaborative, QE, Qualified Clinical Data Registry, State HIE, Quality Measurement System, Data Warehouse, etc.) • Where does data sit – data warehouse? What is in the data warehouse/mart? • What is standardized- what is current that can be leveraged? • What's missing? What is critical? • What is the state, payers and provider's current capacity for measurement)? • Does the state have a quality measure network at state, regional, local levels? • Does everyone participate in the quality measure network if it exists?

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[57] Health IT Modular Functions Appendix B, so that the consistent measurement capabilities can be used to meet the needs of all stakeholders in a value based health system.

Appendix E: Aligning Quality Measures

One of the challenges of executing a health IT -enabled quality measurement strategy is that there are a multitude of programs or initiatives that require a multitude of quality measures. Many of these measures differ from one another and were arrived at due to the different needs of the various programs. The following are useful starting points for states or other entities looking to identify quality measures and ensure their alignment. Such work should be conducted in parallel to strategizing whether to pursue a data extraction or quality measurement extraction approach, as detailed in Appendix G: Application of Data Extraction Principles.

CMS Measure Inventory
The CMS Measures Inventory[58] is a compilation of measures used by CMS in various quality, reporting and payment programs. The Inventory lists each measure by program, reporting measure specifications including, but not limited to, numerator, denominator, exclusion criteria, National Quality Strategy (NQS) domain, measure type, and National Quality Forum (NQF) endorsement status.

Medicaid
HHS is required to publish the core measure sets for both children's health care quality measures and adult quality measures. These are published on the CMS website and can be used as a source for entities wishing to engage in quality measurement alignment work.[59]

Children's Health Insurance Program Reinvestment Act (CHIPRA) of 2009 Quality Measures
CHIPRA required HHS to identify and publish a core measure set of children's health care quality measures for voluntary use by State Medicaid and CHIP programs. CMS has released three measure sets and include an adult core set, a child core set, and a mental health core set. As of December 2016, the 2017 updates to the core set of adult and children's health care quality measures for Medicaid and the Children's Health Insurance Program (CHIP) can be accessed at the following sources on Medicaid.gov.

Federal Policy Guidance - As part of the state-federal partnership in administering the Medicaid and CHIP programs, the Centers for Medicare and Medicaid Services (CMS) issues guidance in the form of letters to State Medicaid Directors, letters to State Health Officials (often regarding CHIP policy or financing issues), Informational Bulletins, and Frequently Asked Questions to communicate with states and other stakeholders regarding operational issues related to Medicaid and CHIP. http://www.medicaid.gov/Federal-Policy-Guidance/Federal-Policy-Guidance.html.

1) Core Set of Adult Quality Measures for Medicaid https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/adult-core-set/index.html
2) Core Set of Child Quality Measures for Medicaid - https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/child-core-set/index.html
3) Core Set of Behavioral Health Measures for Medicaid - https://www.medicaid.gov/medicaid/quality-of-care/downloads/2016-bh-core-set.pdf

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[58] https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/CMS-Measures-Inventory.html

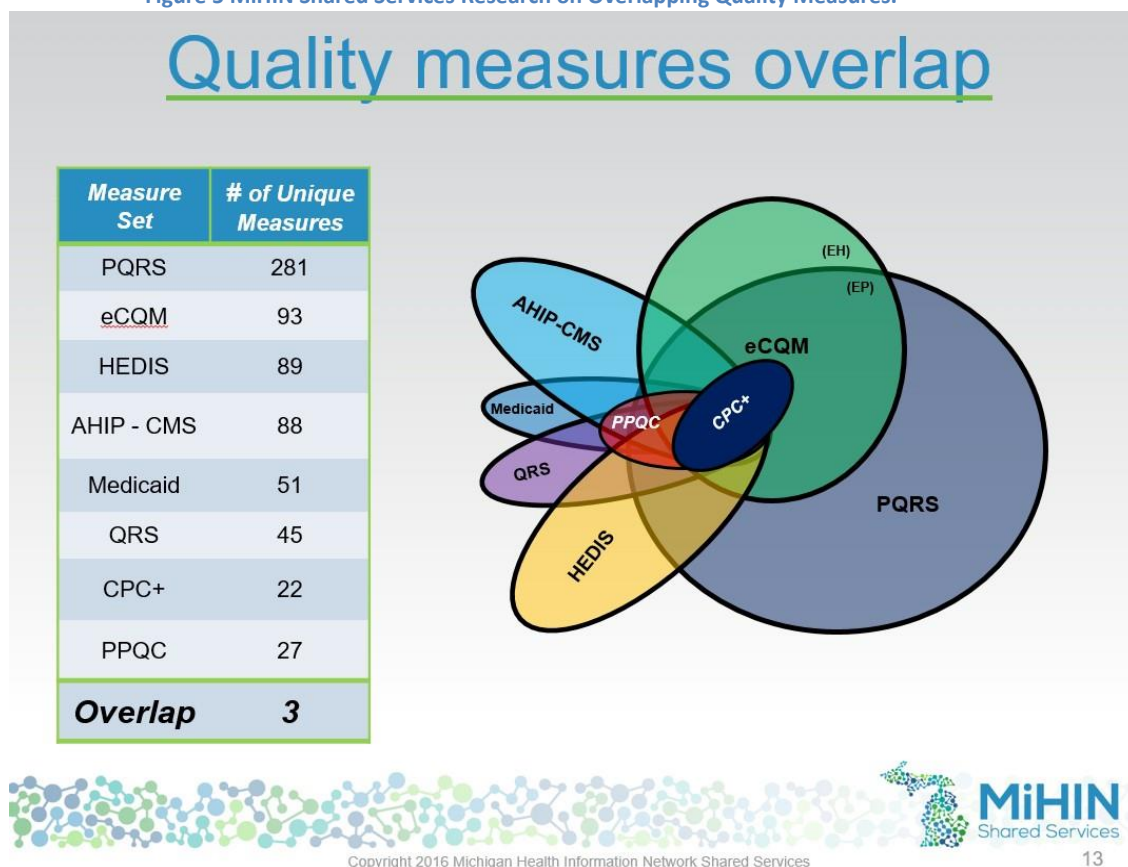[59] https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/index.html

NQF

NQF's Community Tool to Align Measurement[60] (Alignment Tool), developed in collaboration with the 16 Robert Wood Johnson Foundation - Aligning Forces for Quality (AF4Q) community alliances, supports decisions to align measurement and public reporting. While considering local needs and priorities, states, communities, and others can use the Alignment Tool to help align efforts within and across regions, with the National Quality Strategy, as well as with national programs that involve reporting requirements or payment incentives.

State Alignment of Reporting Programs and Measure Sets

Multiple states have engaged in efforts to identify which quality measures are the best for them to initially support and align around. Two notable examples are Michigan and Oregon, as detailed in Appendix K.

Figure 5 MiHIN Shared Services Research on Overlapping Quality Measures. [61]

Quality measures overlap

Measure Set	# of Unique Measures
PQRS	281
eCQM	93
HEDIS	89
AHIP - CMS	88
Medicaid	51
QRS	45
CPC+	22
PPQC	27
Overlap	**3**

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[60] http://www.qualityforum.org/alignmenttool/

[61] https://www.michigan.gov/documents/mdhhs/Nov_2015_HIT_Commission_Presentation_506708_7.pdf

The following table identifies Michigan's program reporting and measure set alignment for Federal and state quality measurement programs.

	eCQMs	PQRS (future MIPS)	Medicaid Core Sets	CPC+	HEDIS®	QRS	AHIP / CMS Core Sets	PPQC (Michig a n)
Full Name	Electronic Clinical Quality Measures	Physician Quality Reporting System	Medicaid Quality Measurement Program	Comprehensive Primary Care Plus	Healthcare Effectiveness Data and Information Set	Quality Rating System	Core Quality Measures Collaborative	Physician-Payer Quality Collaborative
Collected by	CMS or State Medicaid	CMS	CMS	CMS	NCQA	CMS	CMS	PPQC
Reported by	Providers and Hospitals	Providers	Providers	Providers	Payers	Health Plans offered on marketplace	Payers	Payers
Number of Measures	64 for EPs 29 for EHs	281	51	22	93	43	88	27

eCQM Measure Alignment Table[62] (as of September 2016)

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [63]	Medicaid [64]	CHIP [65]	QPP [66]	Owner (Developer)
Acute	Appropriate Treatment for Children with Upper Respiratory Infection	69 (154)	Pediatric	☐☐			☐☐	☐☐				NCQA[67]
	Ambulatory Care – Emergency Department (ED) Visits (AMB)	NA[68]	Pediatric				☐	☐		☐☐		NCQA
Behavioral Health/ Chronic Care	ADHD: Follow-Up Care for Children Prescribed Attention-Deficit/ Hyperactivity Disorder Medication	108 (136)	Pediatric	☐☐			☐☐	☐☐			☐	NCQA
	Dementia: Cognitive Assessment	NA (149)	Adult			☐☐		☐*			☐	AMA PCPI[69]
	Depression Remission at Twelve Months	710 (159)	Adult	☐☐	☐☐	☐☐		☐☐			☐	MNCM[70]

Behavioral Health/ Chronic Care

Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Depression Utilization of the PHQ-9 Tool	712 (160)	Adult	☐ ☐				☐ ☐			☐	MNCM
Initiation and Engagement of Alcohol and Other Drug Dependence Treatment	4 (137)	Adult Adolescent			☐ ☐	☐ ☐	☐ ☐	☐ ☐		☐	NCQA
Bipolar Disorder and Major Depressions: Appraisal for alcohol and chemical substance use	NA		☐							☐	CQAIMH[71]
Medical Assistance with Smoking and Tobacco Use Cessation (MSC)	27	Adult						☐ ☐			NCQA
Antidepressant Medication Management (AMA)	105	Adult						☐ ☐		☐	NCQA
Adult Major Depressive Disorder: Suicide Risk Assessment (MDD)	104	Adult	☐					☐		☐	PCPI[72]
Follow up After Hospitalization for Mental Illness	576	Adult Pediatric						☐ ☐	☐ ☐		NCQA

[71] Center for Quality Assessment and Improvement in Mental Health
[72] Physician Consortium for Performance Improvement

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Behavioral Health / Chronic Care	Diabetes screening for people with Schizophrenia or Bipolar Disorder who are using Antipsychotic Medications (SSD)**	1932	Adult						☐ ☐			NCQA
	Adherence to Antipsychotics for Individuals with Schizophrenia	NA	Adult						☐ ☐			NCQA
	Use of Opioids at High Dosage	NA	Adult						☐ ☐			PQA
	Follow-Up Care for Children Prescribed Attention-Deficit/Hyperactivity Disorder (ADHD) Medication (ADD)	0108	Pediatric							☐ ☐		NCQA
	Child and Adolescent Major Depressive Disorder: Suicide Risk Assessment (SRA)	1365	Pediatric							☐ ☐	☐	AMA-PCPI

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Behavioral Health/Chronic Care	Use of Multiple Concurrent Antipsychotics in Children and Adolescents (APC)*	NA	Pediatric							☐☐		AHRQ-CMS CHIPRA[73] NCINQ[74]
Chronic Disease Care	Medication Management for People with Asthma (MMA)	NA	Pediatric							☐☐		NCQA
	Controlling High Blood Pressure	18 (165)	Adult	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐		☐	NCQA
	Coronary Artery Disease (CAD): Beta-Blocker Therapy - Prior Myocardial Infarction or Left Ventricular Systolic Dysfunction (LVEF <40%)	NA (145)	Adult					☐*			☐	AMA PCPI
	Diabetes: Eye Exam	55 (131)	Adult	☐☐	☐☐	☐☐	☐☐	☐☐	☐		☐	NCQA
	Diabetes: Foot Exam	56 (123)	Adult	☐☐	☐☐			☐☐	☐		☐	NCQA
	Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c Testing (HA1c)	57	Adult						☐☐			NCQA

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition[64]	Medicaid[65]	CHIP[66]	QPP[67]	Owner (Developer)
Chronic Disease Care	Diabetes: Hemoglobin A1c Poor Control (>9%)	59 (122)	Adult	□□	□□	□□	□□	□□	□□		□	NCQA
	Diabetes: Medical Attention for Nephropathy	62 (134)	Adult	□□	□□		□□	□□			□	NCQA
	Diabetic Retinopathy: Communication with the Physician Managing Ongoing Diabetes Care	089	Adult	□□							□□	PCPI
	Diabetic Retinopathy: Documentation of Presence or Absence of Macular Edema and Level of Severity of Retinopathy	088	Adult	□□							□□	PCPI
	PQI 01: Diabetes Short-Term Complications Admissions Rate (PQI01)	272	Adult						□□			AHRQ[75]
	PQI 08: Heart Failure Admission Rate (PQI08)	277	Adult						□□			AHRQ

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[75] Agency for Healthcare Research and Quality

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Chronic Disease Care	PQI 05: Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI05)	275	Adult						□□			AHRQ
	PQI 15: Asthma in Younger Adults Admission Rate (PQI15)	283	Adult						□□			AHRQ
	Plan All-Cause Readmissions (PCR)	1768	Adult						□□			AHRQ
	Functional Status Assessment for Congestive Heart Failure	NA (90)	Adult					□□				CMS[76] (NCQA)[iv]
	Heart Failure: Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction	2907 (135)	Adult					□*			□	AMA PCPI

[76] This measure is included with the permission of the measure owner and steward, the Centers for Medicare & Medicaid Services (CMS). CMS contracted with NCQA to develop this electronic measure.

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Chronic Disease Care	Heart Failure: Beta-Blocker Therapy for Left Ventricular Systolic Dysfunction	2908 (144)	Adult					☐*			☐	AMA PCPI
	Hypertension: Improvement in Blood Pressure	NA (65)	Adult					☐☐			☐	CMS (NCQA)
	Ischemic Vascular Disease (IVD): Use of Aspirin or Another Antiplatelet	68 (164)	Adult		☐☐			☐☐			☐	NCQA
	Use of High-Risk Medications in the Elderly	22 (156)	Adult	☐☐		☐☐	☐☐	☐☐			☐	NCQA
	PQI 15: Asthma in Younger Adults Admission Rate (PQI15)	2082	Adult						☐☐			HRSA
	HIV/AIDS: Pneumocystis Jiroveci Pneumonia (PCP) Prophylaxis	405	Adult								☐	NCQA
	Annual Monitoring for Patients on Persistent Medications (MPM)	2371	Adult									NCQA
Overuse	Use of Imaging Studies for Low Back Pain	52 (166)	Adult	☐☐	☐☐	☐☐	☐☐	☐☐			☐	NCQA

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Immunization	Childhood Immunization Status	38 (117)	Pediatric	□□			□□	□□			□	NCQA
	Preventive Care and Screening: Influenza Immunization	41 (147)	Adult Pediatric					□*			□	AMA PCPI
	Flu Vaccination	39	Adult						□			NCQA
	Preventative Care and Screening: Influenza Immunization	041	All								□	PCPI
	Immunizations for Adolescents	1407	Pediatric							□		NCQA
	Human Papillomavirus Vaccine for Female Adolescents (HPV)	1959	Pediatric							□□		NCQA
Preventative Care	Breast Cancer Screening	2372 (125)	Adult	□□	□	□	□□	□□		□□		NCQA
	Cervical Cancer Screening	32 (124)	Adult	□□	□	□	□□	□□	□□	□	□	NCQA
	Chlamydia Screening for Women	33 (153)	Adult Pediatric	□□			□□	□□	□□	□□	□	NCQA
	Colorectal Cancer Screening	34 (130)	Adult	□□	□□	□□	□□	□□			□	NCQA
	Childhood Immunization Status	38	Pediatric							□□		NCQA
	Well-Child Visits in the First 15 months of Life (W15)	1392	Pediatric							□□		NCQA

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Preventative Care	Adolescent Well-Care Visit	NA	Pediatric							□□		NCQA
	Falls: Screening for Future Fall Risk	101 (139)	Adult			□□	□□	□*			□	AMA PCPI
	Maternal Depression Screening	NA (82)	Adult Pediatric					□□			□	NCQA
	Developmental Screening in the Third, Fourth, Fifth and Sixth Years of Life (W34)	1448	Pediatric							□□		OHSU[77]
	Pneumococcal Vaccination Status for Older Adults	43 (127)	Adult				□□	□□			□	NCQA
	Preventive Care and Screening: Body Mass Index Screening and Follow-Up Plan	421 (69)	Adult		□□			□□			□	CMS (QIP)[78v]
	Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented	NA	Adult	□							□□	CMS

[77] Oregon Health and Science University

[78] This measure is included with the permission of the measure owner and steward, the Centers for Medicare & Medicaid Services (CMS). CMS contracted with Quality Insights of PA to develop this electronic measure.

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Preventative Care	Preventive Care and Screening: Screening for Depression and Follow-Up Plan	418 (2)	Adult Pediatric	☐ ☐				☐ ☐	☐ ☐		☐	CMS (QIP)
	Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention	28 (138)	Adult		☐ ☐	☐ ☐		☐*			☐	AMA PCPI
	Primary Caries Prevention Intervention as Offered by Primary Care Providers, including Dentists	NA (74)	Adult Pediatric					☐ ☐			☐	CMS (NCQA)
	Weight Assessment and Counseling for Nutrition and Physical Activity for Children and Adolescents	24 (155)	Pediatric	☐ ☐			☐ ☐	☐ ☐		☐ ☐	☐	NCQA
	Adult Body Mass Index Assessment (ABA)	NA	Adult						☐ ☐			NCQA

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP[66]	QPP[67]	Owner (Developer)
Maternal and Perinatal Health	Pediatric Central Line-Associated Bloodstream Infections – Neonatal Intensive Care Unit and Pediatric Intensive Care Unit (CLABSI)	0139	Pediatric									TJC
	PC-02: Cesarean Section (PC02)	0471	Pediatric									CDC
	Live Births Weighing Less Than 2,500 Grams (LBW)	1382	Pediatric									NCQA
	Frequency of Ongoing Prenatal Care (FPC)	1391	Pediatric									NCQA
	Prenatal & Postpartum Care: Timeliness of Prenatal Care (PPC)	1517	Pediatric									CDC
	Audiological Evaluation No Later Than 3 Months of Age (AUD)*	1360	Pediatric									AMA-PCPI
	Behavioral Health Risk Assessment (for Pregnant Women) (BHRA)	NA	Pediatric									CDC
	Pregnant Women that had HBsAg (hepatitis B) Testing	NA	Adult								☐	OptumInsight

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP[66]	QPP[67]	Owner (Developer)
Admin QMs	Closing the Referral Loop: Receipt of Specialist Report	NA (50)	Adult Pediatric			☐☐		☐☐			☐	CMS (NCQA)
	Documentation of Current Medications in the Medical Record	419 (68)	Adult				☐☐	☐☐			☐	CMS (QIP)
Care Coordination	Timely Transmission of Transition Record (Discharges from an Inpatient Facility to Home/Self Care or Any Other Site of Care) (CTR)	648	Adult						☐☐			AMA-PCPI
Experience of Care	Consumer Assessment of Healthcare Providers and Systems (CAHPS®) Health Plan Survey, Version 5.0 (Medicaid) (CPA)	6	Adult Pediatric						☐☐	☐☐		AHRQ
	Functional Status Assessment for Total Hip Replacement	NA	Adult	☐							☐	CMS
	Functional Status Assessment for Total Knee Replacement	NA	Adult	☐							☐	CMS

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Experience of Care	Functional Status Assessment for Congestive Heart Failure	NA	Adult	☐ ☐							☐ ☐	CMS
	Oncology: Medical and Radiation- Pain Intensity Quantified	384	all	☐ ☐							☐ ☐	PCPI
Access of Care	Child and Adolescents' Access to Primary Care Practitioners (CAP)	NA	Pediatric								--	NCQA`
Oral Health	Prevention: Dental Sealants for 6–9 Year-Old Children at Elevated Caries Risk (SEAL)	2508	Pediatric									DQA[79] (ADA)
	Children Who Have Dental Decay or Cavities	NA	Pediatric	☐							☐	CMS
	Percentage of Eligibles Who Received Preventive Dental Services (PDENT)	NA	Pediatric									CMS
Efficiency & Cost Reduction	Appropriate Testing for Children with Pharyngitis	NA	Pediatric	☐							☐	NCQA

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[79] Dental Quality Alliance (American Dental Association)

	Measure Title	NQF # (CMS eCQM #)	Population	NCQA eMeasure Certification	CMS/AHIP Consensus Core Set ACO & PCMH	CPC+	HEDIS Plan Level	NCQA PCMH Recognition [64]	Medicaid [65]	CHIP [66]	QPP [67]	Owner (Developer)
Efficiency & Cost Reduction	Appropriate Treatment for Children with Upper Respiratory Infection (URI)	069	Pediatric	☐ ☐							☐ ☐	NCQA
	Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low Risk Prostate Cancer Patients	389	All	☐ ☐							☐ ☐	PCPI
Effective Clinical Care	Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery	565	Adult	☐ ☐							☐ ☐	PCPI
	Primary Open-Angel Glaucoma (POAG): Optic Nerve Evaluation	086	Adult	☐ ☐							☐ ☐	PCPI
Patient Safety	Cataracts: Complications within 30 days Following Cataract Surgery Requiring Additional Surgical Procedures	564	Adult	☐ ☐							☐ ☐	PCPI

Appendix F: Quality Measurement Technical Architecture

The term 'Architecture' in an information technology context refers to specific topical layers of the information technology solutions supporting an operating entity. At the highest organizational level – the enterprise – architecture is the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key principles and models that describe the enterprise's future state and enable its evolution. The scope of the enterprise architecture includes the people, processes, information and technology of the enterprise, and their relationships to one another and to the external environment. 'Enterprise' is a relative term in the context of healthcare and can scale from a department focused on quality measure production, to the Medicaid agency, or to all of state government.

Why is this important?

Healthcare delivery and payment is moving away from a transactional fee-for-service model to models based on outcomes with individual patients, with improvements in broader population groups, and with cost reductions. These newer advance payment models are made possible by the widespread implementation of electronic medical and health record systems (EMR/EHR), certified to standards, and operating in an infrastructure that supports health information exchange and promotes interoperability.

There are layers or aspects of architecture that should be aligned to execute an organization's strategy:

- Strategy – define the enterprise strategy, goals and objectives;
- Business – business processes that support the strategy;
- Applications and Systems – these applications support the business and implement the business functions in the IT systems;
- Information and Data – Information is essential for the organization, the fuel that drives the architecture;
- Network and Infrastructure – The infrastructure supports the IT technical components: servers, networks, etc.
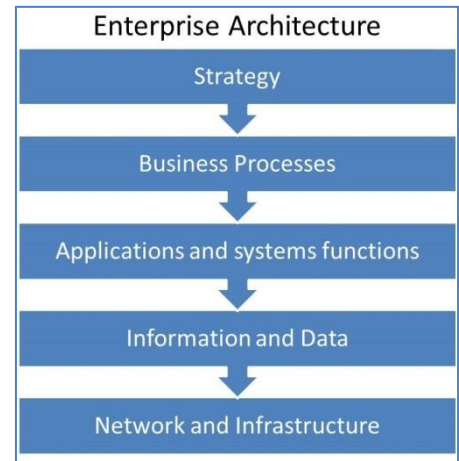
Figure 6 Enterprise Architecture Layers

Strategy: A strategic architecture should recognize this transition to APM and accommodate not only a specific current opportunity (e.g., a SIM/Medicaid initiative) but also anticipate the expansion of an initial initiative to include the multi-payer participation of all providers, for all populations of individuals. The strategic architecture should also anticipate the advancement of technology and the evolution of standards and interoperability.

Business Processes: With a strategic architectural framework in place, business processes can be reviewed and redefined as necessary to better support this strategy. The external stakeholder engagement initiated in developing the strategic architecture can continue to be leveraged to pursue the business architecture. Practically, these stakeholders may be assembling for a specific purpose, perhaps to address the specifics of an 1115 Waiver or a population health plan, but the stakeholder collaboration should be informed by, and aligned with, the longer-term strategic goals.

Application and Systems Functions: With these strategic and business architectural components in place the technology required to support the initial and longer term opportunities can be addressed. This technology layer consists of the systems and functional application modules that together provide all

the functionality needed now, but which has a defined evolutionary path to supporting the longer term strategic and business needs.

Information and Data: Information and Data are significant topics, and the access to and utilization of information and data are both enabled and constrained by the architecture of systems and applications. More importantly, it is this information and data layer of an enterprise architecture that focuses the value of all of the architecture considerations discussed so far. Over time, the expansion of advanced payment models will require the utilization of live automated data, where data are automatically acquired from EHRs to a central aggregator tool for calculation, comparison, reporting, and population level characterizations. The architecture should accommodate a data automation track that might begin with Claims data (HEDIS), then self-reported, then live automated data, and finally integrated data.

Network and Infrastructure: This is the base technology layer of servers, network components, and interconnecting services to interconnect and move information from point to point.

A transition from a fee-for-service healthcare model to a fully implemented advanced payment model - with multi-payer participation and supported by appropriate quality measures – has a higher probability of success if developed through a disciplined application of the architectural considerations described here. This is not a once-and-done proposition. Healthcare delivery and payment models will continue to evolve, calling for reconsiderations of strategic, business, and technology goals and plans. Undertaking this reconsideration from the perspective of an architecture framework is a recommended best practice.

Health IT Architecture and Medicaid
State Medicaid programs rest on an infrastructure of major system components that manage the eligibility and enrollment of beneficiaries, the processing of claims from providers for Medicaid services delivered, and the payment for these services. Other components address provider enrollment, administrative functions, auditing (program integrity), reporting and analysis. The major components in this infrastructure have been going through a transition from large monolithic systems to modular systems that can exchange data and interact through such stratagems as service oriented architecture and web services. This transition is the result of the introduction of the Medicaid Information Technical Architecture (MITA) concept and the associated requirement that states begin this transition to modularity and interoperability by undertaking a MITA Self-Assessment.

As healthcare evolves to delivery transformation and advanced payment models, Medicaid is also evolving in this direction, with waivers that support the transition from fee-for-service models. Medicaid is a major payer in every state, and will likely be participating in multi-payer models, if not leading the discussions to develop those models. MITA standards and guidance provide a framework for considering many elements of a healthcare infrastructure and should be adopted by any initiatives, such as SIM, that are led by the state. A multi-payer infrastructure should also be informed by the MITA standards that will apply to the state as a significant payer in the landscape.

MITA is intended to help the MMIS become the "central information nervous system," supporting the entire Medicaid enterprise in a standard way. A universal data dictionary and standard definitions of common data elements will help MMIS transcend platforms. Using "best of breed" systems for special purposes requires that these individual systems be compatible with the MMIS's data and architecture standards, so they can communicate directly with each other and the resulting processed data will be meaningful when merged into operational data stores.

MITA is an architectural framework presented as a template consisting of principles, business and technical models, and guidelines. MITA is also the processes to adopt this framework through shared

leadership, partnering, and reuse of solutions. MITA planning guidelines lead to tailored enterprise architectures and form the basis for Federal Financial Participation (FFP) for MMIS.

CMS will use an updated APD review process and criteria to ensure that state IT planning meets MITA goals and objectives.

Federal Health Architecture

The Federal Health Architecture (FHA) is an E-Government Line of Business (LOB) initiative designed to bring together the decision makers in federal health IT for inter-agency collaboration – resulting in effective health information exchange (HIE), enhanced interoperability among federal health IT systems and efficient coordination of shared services. FHA also supports federal agency adoption of nationally-recognized standards and policies for efficient, secure HIE.

Established as an Office of Management and Budget E-Government LoB in 2004, FHA reaches out to more than 20 federal agencies to advance the national agenda for health IT. Current partners include the Department of Health and Human Services (Managing Partner), including the Centers for Medicare & Medicaid Services and Indian Health Services; Office of Management and Budget, Department of Defense, Department of Veterans Affairs and the Social Security Administration.

FHA advances the national agenda for health IT by focusing on precepts of:
- Capture (Architect federal HIT)
- Analyze (Gap/Overlap Analyses to derive streamlined and Shared Service Opportunities)
- Design (Promote, oversee, coach, pilot potential Shared Services)
- Communicate (Facilitate information sharing to convene best approaches)

FHA is focused on the federal enterprise, to improve inter-agency interoperability and sharing of services. Ultimately, state architectures for Health IT will contain services which will interact with federal services, and these interactions will be orchestrated through FHA models. FHA has developed an extensive Federal Health Information Model (FHIM) with over 3,500 defined data elements. Exploring this information model can inform state Health IT planners and architects of the detail required at the information and data layer, and it is also a resource of information that can be leveraged for state models.

The purpose of the FHIM is to support interoperability requirements for the FHA's federal partners by serving as a Logical Information Model that identifies common data (i.e. terminologies, value sets, etc.) for the enhanced collection, sharing and use of critical information between federal agencies and private sector healthcare organizations. Through the S&I Framework, the FHIM is also supporting Meaningful Use efforts and Blue Button Plus in order to advance healthcare nationwide.

The Federal Health Architecture has additional initiatives for Directed Exchange, Healthcare Directory, and Patient Consent and Authorization. These initiatives are focused on federal agency use cases and applications but for these topics any solutions that are acceptable at the federal level will have benefits that can be leveraged for state solutions as well.

The Seven Conditions and Standards

The Seven Conditions and Standards are threshold tests that are applied by CMS in evaluating APD funding requests for Health IT. A reference is provided below, as detail is not provided here, but the very names of the six conditions and one standard are informative as to their content:
1. Modularity Standard
2. MITA Condition
3. Industry Standards Condition

4. Leverage Condition
5. Business Results Condition
6. Reporting Condition
7. Interoperability condition

Architecture Artifacts
Most effective architecture documentations make liberal use of diagrams to convey the architecture components and to indicate the interactions and interoperability between components. This approach can be effective at all layers of an enterprise architecture, including the strategic layer. The complexity of the diagrams tends to increase as the layers being depicted reach the systems and applications layer, and then especially the technology layer. The Information and Data layer requires additional detailed documentation of data elements, presented in tables or spreadsheets or captured in an architecture management system. Also, each component in the systems and applications layer is a placeholder for an architecture that applies to that particular system. This can all be managed by working through the layers from top to bottom and keeping the relationships between components in mind.

Developing Health IT Architecture for SIM / State Health IT Initiatives
Begin by considering the Health IT Modular Functions illustration (Appendix C), which is intended to identify the foundational components, technical infrastructure, and technical functions needed for multiple use cases required to enable advanced payment models.

This illustration developed by ONC noted in Appendix B identifies a combination of modular functions, applications, and policy/procedural areas that support use cases for Health IT-enabled quality measurement production and other Health IT implementations. Such things as an Enterprise Master Person Index (EMPI) for Identity Management or a Provider Directory are components that should be identified in the application and systems layer of your architecture.
Here are some suggested steps to develop and implement architecture for Health IT:
1. Use an Architect: State CIO organizations usually have enterprise architecture groups who may be available to help with the Health IT architecture work. At a minimum they can inform your efforts of architecture standards and guidelines that may exist at the state level. Even better, the Medicaid agency may have its own dedicated architecture resources that would have MITA and Health IT background. IT architecture is a refined discipline with its own best practices, terminology, and agreement on artifacts and layers. Seek out this resource as soon as possible.
2. Engage Stakeholders Early and Often: Internal (to the state) stakeholders can include the Medicaid Agency, other health and human services agencies, Public Health, and perhaps the state CIO organization. External stakeholders, for multi-payer considerations, include payers and providers, and the organizations that represent them. Health Information Exchange entities are another group of stakeholders to be considered.
3. Identify and Leverage Existing Resources and Assets:
   - Document available data sources (private and public). Consider clinical providers, hospitals, Commercial payers, quality information organizations, APCDs, Medicaid systems.
   - Identify data stores for clinical data and or claims data aggregation for measurement
   - Are there any HIEs to assist with data extraction, transport, aggregation?
   - Does the state or partners have an advanced analytics system?
   - What are feedback mechanisms available? Portals? Quality report feedback loops?
4. Use MITA Processes: The MITA framework provides extensive guidance and templates to work through all of the considerations for architecture. There are many other approaches available, but

since the Medicaid agency is using (or should be using) MITA, it is best to leverage the MITA resources and benefit from progress and experience that already exists.

5. Consider Existing Examples: Existing documented architectures from other states and initiatives can inform your architecture efforts and can serve as To-Be targets for the artifacts that will document your own architecture.

6. Use Parallel Work Streams: As important as architecture is, if there is currently no documented architecture to refer to, your Health IT initiative probably can't wait for the architecture work to complete. For example, a SIM initiative may require Alert Notifications to support achieving a measure of Hospital re-admissions that is tied to a payment incentive. There are steps that can be taken to ensure that the solution implemented now will more likely be compatible with infrastructure architecture once it is defined. These steps include following the seven conditions and standards and using approved standards for the components of your solution (e.g., if a Provider Directory is a part of the notifications solution it should comply with the existing IHE Health Provider Directory standard).

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13. CMS resources: Enhanced Funding Requirements: Seven Conditions and Standards https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Data-and-Systems/Downloads/EFR-Seven-Conditions-and-Standards.pdf
14. Agency for Healthcare Research and Quality (AHRQ) Health Information Technology best practices page on Architecture of Health IT – links to resources following architecture layers beginning at the Application level and extending through Communication, Process, and Device levels. https://healthit.ahrq.gov/key-topics/architecture-health-it

Appendix G: Application of Data Extraction Principles

Appendix G is an application of a decision making framework to the question of measurement extraction or data extraction strategy. This is the same decision making framework presented throughout the main body of the Implementation Guide driven by considerations using foundational components for data infrastructure.

Introduction to Measure Extraction versus Data Extraction

Although an array of data sources will ultimately be used for these purposes, the widespread use of Electronic Health Record systems (EHRs) is an important source of patient-level information for multiple purposes including measurement of quality and health status. While harvesting EHR data for measurement is logical, experience across the country has highlighted challenges to extracting and transmitting person-level data for measurement.

The challenges are complex and encompass business, technical, legal, and financial issues. In response, stakeholders are challenged with a decision on how to start using EHR data for measurement. Can providers generate measure results from each EHR system using a clear set of measure specifications (measure extraction strategy), or can providers extract person level data from each EHR system and transmit it for centralized aggregation and measurement (data extraction strategy)? Choosing between these strategies should involve a careful consideration of the advantages and limitations of each, and a careful examination of the stakeholders' readiness to work together for a successful result.

Appendix I provides a data sharing readiness assessment to help determine which circumstances favor patient-level data extraction with centralized measurement and which circumstances favor measure extraction from each EHR source. Given the complexity of the issues and the variation in readiness across settings, it is likely for a hybrid approach with a blend of data extraction and measure extraction. This decision guide is based on two important principles. First, recognize that patient-level data extraction and centralized measurement requires components of ONCs Health IT Modular Functions (Appendix B). Second, successful implementation of the health IT technical depends requires the foundational components of the stack in place. These foundational components are considered necessary for traditionally independent provider groups to work together, share data, and produce comparative measurement. The decision process mapped out in this guide employs a series of questions to determine the status of each of these foundational components, and whether they are likely to favor data extraction or measure extraction for various provider groups in various settings. The results can be used to help sort out differences in the state of readiness across settings, outline a plan for initiating the use of EHR data for clinical quality measurement (CQM), and to outline a targeted plan to enhance the foundational components of the Health IT Modular Functions.

Context for Choosing a Measure Extraction or Data Extraction Strategy

This decision support tool is intended to help states determine an actionable strategy for using clinical data from EHRs to measure quality. The process starts with recognition of two distinctly different approaches to using data from EHRs to generate results of CQM. One approach is the measure extraction method, where each organization or provider site generates measure results (numerator and denominator) using their own EHR data and a set of measure specifications. The second approach is the

data extraction method, where patient-level data is transmitted from each EHR to a centralized infrastructure where measure results are generated for all participant sites. For the purposes of this decision guide, the data extraction method is a general approach intended to apply to all formats of data that can be extracted from EHRs with the goal of maximizing data aggregation.

With the shift to value-based payment models, states and providers have an increasing need to use EHR data to measure quality, and they are often faced with deciding whether to use measure extraction, data extraction, or a hybrid process using both methods to accommodate different levels of provider engagement and readiness. The decision on which strategy to use should consider the advantages and disadvantages of each, some of which are summarized in the table below.

Comparison of Measure Extraction vs. Data Extraction

Item	Measure Extraction	Data Extraction
Initial costs to generate measure results	**Lower Initial Costs** - Less expensive without the investments in infrastructure	**Higher Initial Costs** - More expensive with the investments in infrastructure
Speed of Implementation	**Faster Implementation** – In many cases, providers can initially produce measure results at a faster pace	**Slower Implementation** - In many cases, it will take longer to initially set up a data extraction process and produce measure results.
Ongoing maintenance and operating costs	**Higher Ongoing Costs**- Labor and time-intensive process likely remains costly, persists high measurement burden for provider sites, and produces a lower quality end result.	**Lower Ongoing Costs** – Likely to be less costly overall due to shared resources, reduced measurement burden for providers, and a higher quality end result.
Provider security and control over patient level data	**More Control** - Organization or provider site with source EHR maintains full control. Relies on security and protections with the source organization or provider site.	**Less Control** - Organizations and provider sites share control through governance process. Relies on security and protections through the chain of data extraction, transmission, management, and use.
Data quality and reliability	**More Variable** - Dependent on capabilities and resources within each organization or provider site	**Less Variable** – Shared infrastructure can be used to standardize data and drive consistent data quality initiatives
Data utility for quality measurement	**Lower Utility** – Results are not based on patient data linked across settings, and do not reflect complete information.	**Higher Utility** – Results are based on patient data linked across settings, and do reflect more complete information.
Comparability of results across settings	**Lower Comparability** – Increased likelihood of variable methods across settings including attribution, application of measure specifications, and identification / correction for gaps with data integrity. Without aggregated data, you will not be able to make adjustments for differences in the characteristics of the populations across settings.	**Higher Comparability** – Best opportunity for consistent methods across settings including attribution, application of measure specifications, and identification and correction for gaps with data integrity. Aggregated data allows you to consistently adjust measure results based on differences in the characteristics of the populations across settings.

As compared to measure extraction, data extraction and aggregation in a central infrastructure provides the opportunity for more reliable comparative measurement across EHR systems. However, this approach is more complicated than measure extraction, including planning, business agreements, governance, legal considerations, up front investments, and technology. To assist with the decision of whether to pursue the data extraction strategy, this document lays out a series of questions that should be considered for planning and implementation. These questions are aligned with the foundational components of the Health IT Modular Functions ([Appendix B](#)). They provide a framework for successful using clinical data from EHRs, as well as data from other sources such as claims. It is worth noting that investment in this infrastructure will establish the capability to work with linked clinical and claims data, and the capability to link data from other state data sources that could be used to inform a health system such as housing, transportation, labor, and corrections. Implementation of the data extraction strategy is complex, but establishing the agreement to share data and infrastructure enables implementation of the technical components and services.

Framework for Choosing a Measure Extraction or Data Extraction Strategy

Deciding to pursue a measure extraction strategy or a data extraction strategy should begin by evaluating the strength of Health IT Modular Functions foundational components. If these components are in place, or they can be established and / or strengthened, then a good basis exists for the data extraction strategy and potentially a better end result. If these components are not available, then measure extraction may be a better initial approach. It is likely that even within a state these components will vary in terms of development and capability, and a judgment will need to be made as to whether they are adequate and can be enhanced to support data extraction. It is also likely that readiness may vary across provider groups and settings, and that a phased hybrid approach may be most responsive with some sites starting with the data extraction strategy, and the goal of shifting other sites from measure extraction to data extraction over time. The questions below assess the foundational components readiness for data extraction quality measurement.

Question 1. Is there a common business case to pursue patient-level data extraction for centralized, community clinical quality measurement (CQM) over a measure extraction approach?

Answer Options: Choose a score from 1 to 5 for each suggested business case and each provider group (if applicable). Selecting 5 implies that the business case is very compelling for the provider group to pursue data extraction over measure extraction. Selecting 1 implies that the business case is not compelling.

Rating Scale 1 — Not Compelling 2 3 4 5 — Very Compelling
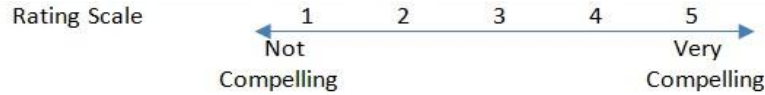
Question 1: The stakeholder has the business need for discreet data extraction and community quality and performance measurement		to participate in an APM.	to improve coordination & quality of services.	for comparative performance & shared learning.	for business operations related reasons.
Larger Hospitals	Urban				
	Rural				
Community Hospitals	Urban				
	Rural				
Health Centers	Urban				
	Rural				
Independent Practices	Urban				
	Rural				
Commercial Payers					
ACOs					
Medicaid					
Medicare					

Question 2. Are *Legal / Policy* structures in place that provide a compelling reason stakeholders to pursue patient-level data extraction for centralized clinical quality measurement (CQM) over a measure extraction approach?

Answer Options: Choose a score from 1 to 5 for each suggested type of policy/legal consideration and each applicable provider group. Selecting 5 implies that the policy/legal consideration provides a very compelling reason for the provider group to pursue data extraction over measure extraction.

Rating Scale 1 — Not Compelling 2 3 4 5 — Very Compelling
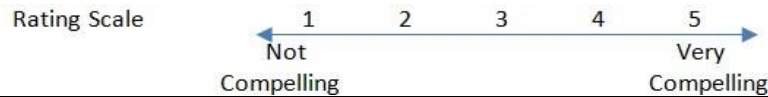
Question 2: Are policy levers/legal structures in place requiring patient level data extraction and centralized CQM		to participate in an APM?	for licensing, credentialing, certificate of need, and rate setting?	to be eligible for grants and external funding?	required for public reporting?
Larger Hospitals	Urban				
	Rural				
Community Hospitals	Urban				
	Rural				
Health Centers	Urban				
	Rural				
Independent Practices	Urban				
	Rural				
Commercial Payers					
ACOs					
Medicaid					
Medicare					

Question 3: Are adequate *Governance* structures in place to pursue patient-level data extraction for centralized clinical quality measurement (CQM) over a measure extraction approach?

Answer Options: Choose a score from 1 to 5 for each suggested governance-related issue and each applicable provider group. Selecting 5 implies that adequate governance processes are in place over where the data is extracted to for the state and stakeholders to pursue a data extraction approach over a measure extraction approach. Selecting 1 implies the opposite.

Rating Scale — 1 2 3 4 5 — Inadequate Governance Process — Adequate Governance Process
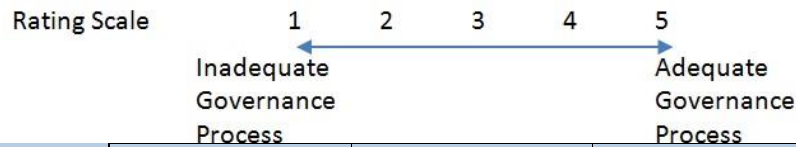
Question 3: Are adequate *Governance* structures in place needed		for adequate influence on decisions related to patient level data extraction and centralized CQM?	to ensure business interests can be protected if patient level data is extracted for centralized CQM?	to support data management & data use strategies chosen for patient level data extraction and centralized CQM?	to support stability & sustainability of patient level data extraction and centralized CQM?
Larger Hospitals	Urban				
	Rural				
Community Hospitals	Urban				
	Rural				
Health Centers	Urban				
	Rural				
Independent Practices	Urban				
	Rural				
Commercial Payers					
ACOs					
Medicaid					
Medicare					

Question 4. Are adequate *Financing* mechanisms available to support development of the infrastructure to pursue patient-level data extraction for centralized clinical quality measurement (CQM) over a measure extraction approach?

Answer Options: Choose a score from 1 to 5 for each financing-related issue and each applicable provider group. Selecting 5 implies that adequate financing mechanisms are in place for the stakeholders to pursue a data extraction approach over measure extraction. Selecting 1 implies the opposite.

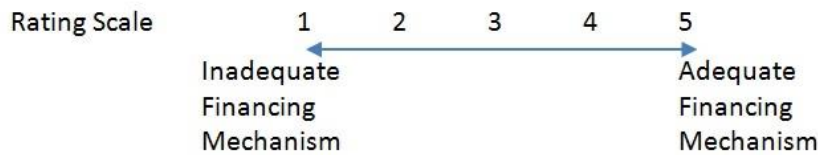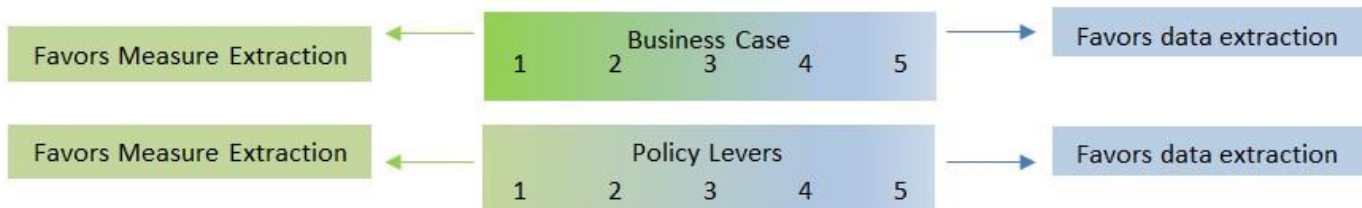| Rating Scale	1	2	3	4	5
	Inadequate Financing Mechanism				Adequate Financing Mechanism

Question 4: Are adequate *Financing* mechanisms available		to support convening & planning costs for patient level data extraction and centralized CQM?	to support interfaces & EHR enhancements for patient level data extraction and centralized CQM?	to support the infrastructure needed to transmit, aggregate, and process patient level data for centralized CQM?	to support analytic and reporting services needed for centralized CQM?	to support data quality work needed for patient level data extraction and centralized CQM?
Larger Hospitals	Urban					
	Rural					
Community Hospitals	Urban					
	Rural					
Health Centers	Urban					
	Rural					
Independent Practices	Urban					
	Rural					
Commercial Payers						
ACOs						
Medicaid						
Medicare						

Using the Assessment to Choose Measure Extraction or Data extraction Strategy

Step 1. Stakeholder motivation and engagement is one of the most important ingredients for active participation health IT-enabled quality measurement. Higher scores suggest compelling motivations are in place for stakeholders to work together to measure and improve quality, and that they may be more likely to take part in a data extraction strategy.

Favors Measure Extraction	←	Business Case					→	Favors data extraction
		1	2	3	4	5		

Favors Measure Extraction	←	Policy Levers					→	Favors data extraction
		1	2	3	4	5		

Step 2: For those stakeholders with sufficient motivation, the next question is whether they have formed, or are in the process of forming, a Governance structure that offers the influence and confidence they need in order to share data and share control over the use of their data for measurement. Higher scores suggest that a more mature governance structure is in place, and the structure may support data sharing for a data extraction strategy. Assessment of Governance is positioned as the second step assuming that Financing can be more readily addressed if motivated

providers have agreed on a governance structure where they are comfortable with the decision making process.
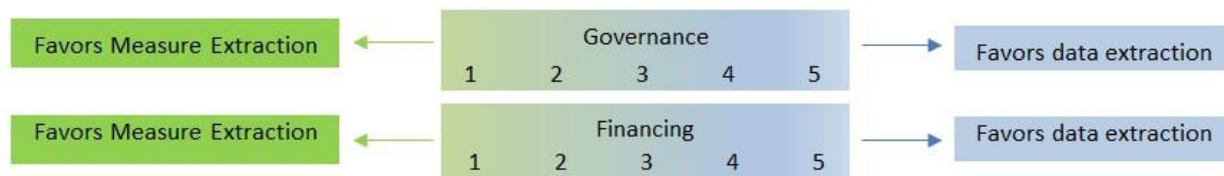
Step 3. Motivated stakeholders within an acceptable governance structure are in a good position to work together to address financing for a data extraction strategy. Participating with the state and Medicaid can take full advantage of opportunities to leverage federal funding mechanisms to design, development, and implement the necessary programmatic and technology infrastructure. Funding strategies are available through can assist with the investments needed for data extraction including convening, planning, connectivity, data processing, data quality, and services for analytics and reporting. Long-term sustainability will depend on stakeholders realizing a sufficient value case from data extraction and health IT-enabled quality measurement. Higher scores suggest adequate financing mechanisms are available, and that upfront costs are less likely to be a barrier for a data extraction strategy.

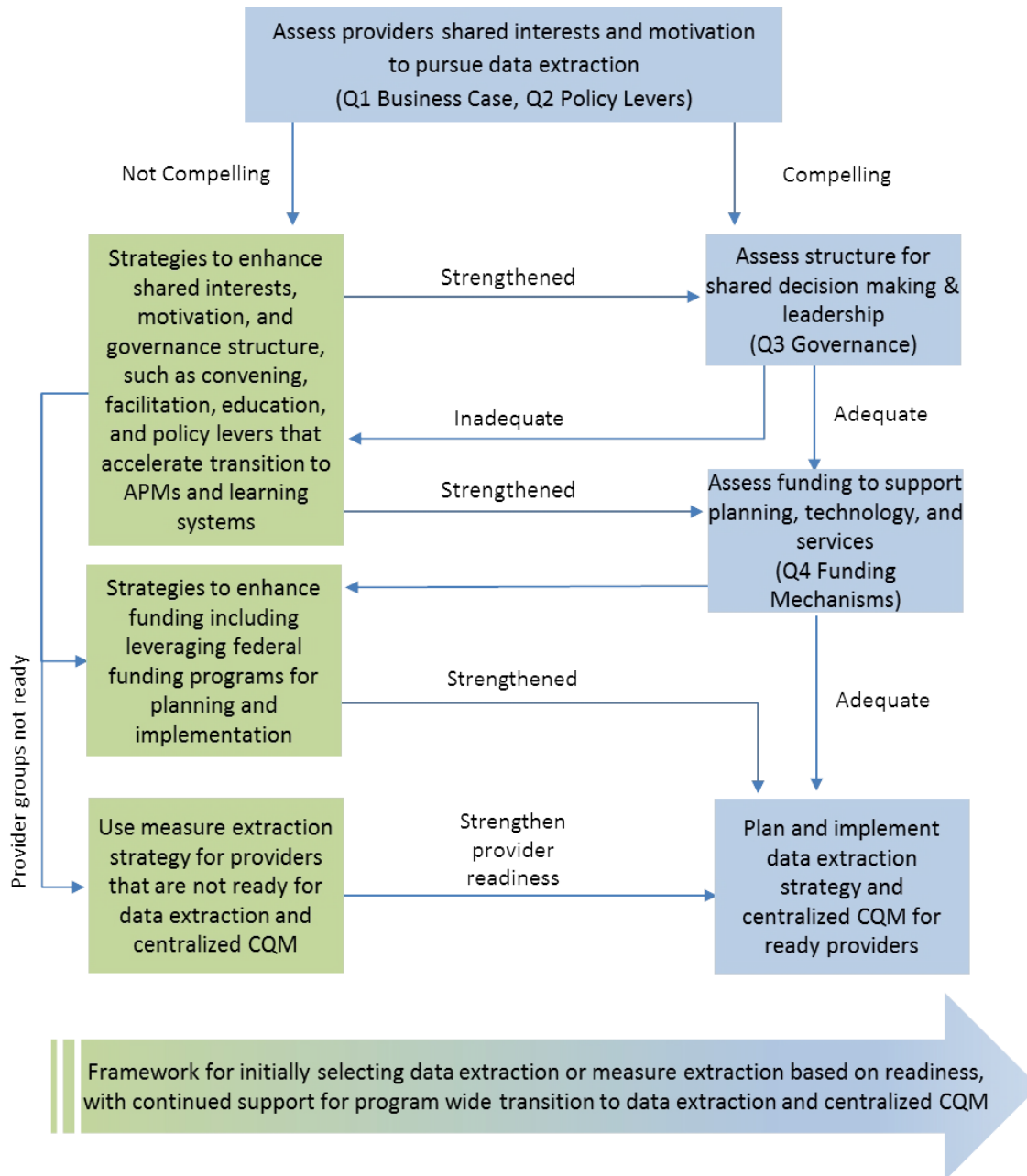States should consider the financing scores they have for each provider group, and determine if they have fully leveraged federal funding to help meet the financial challenges for each group to participate in a data extraction strategy. While this decision guide has sequenced business operations and governance ahead of financing, it is possible that financial incentives can help to engage provider groups that have hesitated due to the pressures of their current circumstances including financial productivity, EHR frustrations, measurement burden, and staffing time. Even though APMs are intended to drive delivery system reform, and change these pressures, real change may seem far off particularly for smaller independent providers. Adequate support for providers with fewer resources may influence their willingness to engage with data extraction and Health IT-enabled quality measurement. Addressing each of the four questions can help determine which providers are ready for a data extraction strategy and which providers are ready for a measure extraction strategy. States can use this information to help map out a detailed plan for implementation of Health IT-enabled quality measurement including whether a hybrid approach is needed to accommodate variable readiness across the provider landscape, and to help organize multi-stakeholder efforts to address gaps related to business operations, policy levers, governance, and financing. A plan that addresses these foundational components of the HIT Stack will make data extraction a more viable option for more provider groups, facilitate planning and implementation of the technical components of the HIT Stack, and in doing so position rapid-cycle Health IT-enabled quality measurement as an integral part of a learning health system that can meet the goals of APMs. A decision map to assist planning and implementation for data extraction is shown below (Figure 2). This decision map is intended to account for variable readiness across provider settings and to assist the likelihood of needing a blended approach that employs data extraction and measure extraction based on readiness, while promoting ongoing transition to data extraction.

Decision Map for Planning and Implementing a Data Extraction Strategy

Assess providers shared interests and motivation to pursue data extraction
(Q1 Business Case, Q2 Policy Levers)

Not Compelling

Compelling

Strategies to enhance shared interests, motivation, and governance structure, such as convening, facilitation, education, and policy levers that accelerate transition to APMs and learning systems

Strengthened

Assess structure for shared decision making & leadership
(Q3 Governance)

Inadequate

Adequate

Strengthened

Assess funding to support planning, technology, and services
(Q4 Funding Mechanisms)

Strategies to enhance funding including leveraging federal funding programs for planning and implementation

Strengthened

Adequate

Provider groups not ready

Use measure extraction strategy for providers that are not ready for data extraction and centralized CQM

Strengthen provider readiness

Plan and implement data extraction strategy and centralized CQM for ready providers

Framework for initially selecting data extraction or measure extraction based on readiness, with continued support for program wide transition to data extraction and centralized CQM

Appendix H: Data Extraction Taxonomy

Why a Need for a Taxonomy?

States, health systems, payers and others are pursuing quality measurement strategies that source data from various health IT systems. If states wish to address the issue and challenges associated with data extraction for quality measurement, they must delineate the different aspects of the problem. This taxonomy seeks to define those key terms generally from the perspective of the provider.

Data Extraction Defined

Data extraction is defined as the activity and considerations related to harvesting data from its sources for the purposes of quality measurement. This usually means the ONC Certified EHR system being used by the provider to conduct care activities, but it can also include other health IT systems as well. The systems we will focus on will be providers' EHRs (not registries, labs, or other sources, although they can be discussed). However, we will explore all aspects of provider readiness for data extraction, including workflow issues and their motivations for conducting data extraction.

Taxonomy of Key Data Extraction Terms

Costs of Data Extraction (for Providers) – For our purposes, we will define costs from the perspective of the provider. All costs associated with data extraction can thus be considered either time spent (which has monetary value) and or funds expended.

> *Time Costs for Providers*: The time aspects would include provider/practice time spent strategizing for quality measurement, analyzing system capabilities, designing contracts with IT consultants, modifying contracts with their EHR vendor, analyzing and redesigning workflow, conducting change management activities, other lost productivity, etc.
> *Funds Expended*: The expenditures associated with data extraction include additional fees to EHR vendors for interfaces, expenses for consultants to make changes to the provider's EHR system, etc.

Benefits of Data Extraction (for Providers) – The benefits associated with data extraction are the quality incentives or shared savings incentives associated with alternative payment models.

Quality of Extracted Data – Data that is extracted for the purposes of quality measurement must meet a certain threshold of reliability/accuracy. Payers and providers will demand that information is accurate within certain thresholds. Models often allow for increasing requirements related to data quality, starting with "pay to report" at first and then evolving to "pay for performance."

Vendor Certification Compliance Issues – Providers may rely on data export capabilities from a particular EHR that are ONC Certified functionalities. EHR vendors that are not compliant with that certification are subject to recourse by certification bodies and/or ONC. For example, under the Data Portability certification criterion, EHRs are required to perform batch export of all CCDAs within their system. If a vendor is certified to this capability, has sold such a product to a provider, yet that functionality is not available to that provider, that vendor would not be in compliance with their certification.

Vendor Not Offering Certified Capabilities – ONC certification is voluntary. Vendors may choose not to offer certain certified capabilities. For example, a vendor may decide to not offer certain eCQM calculations or they may offer them but they may not be certified.

Vendor Non-Transparency – ONC certification requires various transparency and disclosure requirements.[80] This includes the requirement that health IT developers disclose any additional types of costs that a user may incur in order to implement or use capabilities of certified health IT. ONC certification also requires that health IT developers disclose other factors that may similarly interfere with a user's ability to successfully implement certified health IT.

Provider-Vendor Contracting Issues – Providers may have signed a contract with an EHR vendor that does not supply certain functionalities for the system purchased. For example, a provider may have elected to pay a lower price for their EHR with the stipulation in the contract that such system does not produce eCQMs. The fact that such a provider cannot perform data extraction of such eCQMs would be considered a provider contracting issue. However, contracting issues could fall under the category of information blocking. As described in the ONC report on the topic,[81] "contract terms, policies, or other business or organizational practices that restrict individuals' access to their electronic health information or restrict the exchange or use of that information for treatment and other permitted purposes" raise information blocking concerns.

Measure Specification and Standards Issues – The quality of data that is exported may be low due to some problem with the specification of a particular measure or standards associated with certain data elements.

EHR Versioning Issues – This issue arises often when a measure is updated, but the provider has not yet installed the most recent version of the software. The result is that measures or raw data are no longer accurate.

Provider Workflow Issues – The issue with the ability to export high quality data may lie in user error. For example, providers may refuse to enter data into necessary structured fields, instead opting to enter all information as free text into a note. The result of this is that the system will not be able to calculate the appropriate measures or export the appropriate raw data.

Information Blocking Issues – ONC created an information blocking report for Congress that defined information blocking as knowing, unreasonable, interference of the exchange of information. The report describes how these information blocking actions may violate federal or state law. It gives various examples, including charging prices or fees (such as for data exchange, portability, and interfaces) that make exchanging and using electronic health information cost prohibitive. Another example is developing or implementing health IT in non-standard ways that are likely to substantially increase the costs, complexity, or burden of sharing electronic health information, especially when relevant interoperability standards have been adopted by the Secretary.

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[80] https://www.federalregister.gov/articles/2015/10/16/2015-25597/2015-edition-health-information-technology-health-it-certification-criteria-2015-edition-base#p-1537
[81] https://www.healthit.gov/sites/default/files/reports/info_blocking_040915.pdf

Appendix I: Data Extraction Provider Readiness Improvement Tool

For each of the issues described in the **data extraction taxonomy**, this tool is designed to help states develop strategy options and gather resources for addressing those issues.

- Costs of Data Extraction (for Providers)
    - Strategy Options:
        - Contact your local, former REC organization and ask their experience.
        - Conduct a survey sampling of providers.
        - Consider hiring a consultant to assist with such research.
    - Resources:
        - OSEHRA popHealth User Group Tracking Chart of Interface Costs
            - Contact Jackie Mulhall jmulhall@smcpartners.com
        - Former REC list https://www.healthit.gov/providers-professionals/rec-highlights

- Benefits of Data Extraction (for Providers)
    - Strategy Options:
        - To understand the benefits of data extraction requires having an understanding of a state or region's health care environment and the prevalence of new payment models that link payment to or pay for improvement in quality.
        - Contact environmental scan of private payers to learn their APM plans, and the corresponding demand for HIEs or other data aggregation services.
    - Resources:
        - Contact your State Medicaid Agency (https://www.medicaid.gov/about-us/contact-us/contact-state-page.html)
        - ONC's Health IT Policy Levers Compendium (http://dashboard.healthit.gov/dashboards/state-health-it-policy-levers-compendium.php). This tool was developed in coordination with states to catalogue all policy levers that advance health IT interoperability. Key examples that are relevant for data extraction include:
            - Regulations: Arkansas Payment Improvement Initiative requirements.
            - Laws: CT data blocking law (https://www.cga.ct.gov/2015/act/pa/pdf/2015PA-00146-R00SB-00811-PA.pdf).
        - Vermont Blueprint for Health – Health Service Area Profiles: This document compiles data for each HSA based primarily on data from Vermont's all-payer claims database, the Vermont Health Care Uniform Reporting and Evaluation System (VHCURES). It is an example of deep assessment of a state's various health care markets.

- Quality of Extracted Data
    - Strategy Options: The complexity of this topic is covered at length throughout the body of this report. ONC encourages states to review the report and is available to provide technical assistance if states have questions.
    - Resources:
        - Arkansas – ONC Report on EHRs in AR. This document (see Appendix G) describes the state of Arkansas's method and results from performing a provider and vendor readiness assessment for supporting quality measurement extraction.

- Vermont Blueprint Sprint Project Plan: This document describes a process for pursuing the enterprise of data extraction, including needed participants, community evaluation strategy, and specifics on data challenges that may arise. http://blueprintforhealth.vermont.gov/reports_and_analytics/annual_reports
- Kendrick, David. "Infrastructure for Improving Health and Reducing Costs." MyHealth Access. PPT. V2.
    - This PPT shares the experience of MyHealth in being able to assess Data quality by EHR across their community. Their system is able to monitor real-time feeds by data element.
- ONC Practice Transformation Toolkit. April 18, 2014. https://www.healthit.gov/providers-professionals/implementation-resources/practice-transformation-toolkit

- Vendor Certification Compliance Issues
    - Strategy Options: The ONC website offers a pathway for providers and their partners to engage with their vendors and relevant ONC Authorized Certification Bodies about certified capabilities within the product.
    - Resources:
        - ONC Certification Provider Complaint Process https://www.healthit.gov/policy-researchers-implementers/provider-complaint-process

- Vendor Not Offering Certified Capabilities
    - Strategy Options:
        - Not all possible capabilities are required to be certified under the ONC Health IT Certification Program. If providers wish their products to possess certain functionalities from their vendors, they should speak directly with their vendors. It is important to note that vendors may charge more for additional functionalities and the contract would detail these costs. The ONC Health IT Playbook, ONC's contracting guide may provide strategies for negotiation.
        - States or payers can create mechanisms for encouraging developers to create certain functionalities. For example, an APM can include an MOU that vendors and providers must sign in order to see that advanced functionalities are created and used under the APM. This is similar to the Comprehensive Primary Care models.
    - Resources:
        - CPC Plus main page, which includes several Health IT Vendor Materials: https://innovation.cms.gov/initiatives/comprehensive-primary-care-plus
        - The Health IT Playbook can also be found at https://healthit.gov/playbook.

- Non-Transparency by Vendor
    - Strategy Options:
        - Consult the ONC Certification Provider Complaint Process
            - https://www.healthit.gov/policy-researchers-implementers/provider-complaint-process
    - Resources:
        - ONC's 2015 Certification Regulations, which include transparency requirements. Specifically, Health IT Vendors that are certified to certain capabilities under the ONC Health IT Certification Program are also subject to transparency and disclosure requirements. This includes a detailed description of all known material information

concerning additional types of costs that a user may be required to pay to implement or use the Complete EHR or Health IT Module's capabilities, whether to meet meaningful use objectives and measures or to achieve any other use within the scope of the health IT's certification. https://www.federalregister.gov/d/2015-25597/p-1537

- Vendors' transparency and disclosure information is posted on the Certified Health IT Products List (CHPL) with the certified product information. https://chpl.healthit.gov/#/search

- Provider-Vendor Contracting Issues
  - o Strategy Options
    - There are a variety of challenges associated with signing EHR contracts detailed in the ONC guide "EHR Contracts Untangled." Entities struggling in this area should start with that resource and also consider the Weststat document on key contract terms.
    - Collective Purchasing – Groups of providers have joined together in the past to preform collective purchasing of EHRs. Providers should give consideration to antitrust laws, which may be applicable.
  - o Resources:
    - EHR Contracts Untangled – Selecting Wisely, Negotiating Terms, and Understanding the Fine Print. September 2016. https://www.healthit.gov/sites/default/files/EHR_Contracts_Untangled.pdf
    - Weststat. "EHR Contracts: Key Contract Terms for Users to Understand." June 25, 2013. Site: https://www.healthit.gov/sites/default/files/ehr_contracting_terms_final_508_compliant.pdf
    - National Learning Consortium. "Contracting Guidelines and Checklist for Electronic Health Record (EHR) Vendor Selection." March 31, 2012. https://www.healthit.gov/providers-professionals/implementation-resources/nlc-contracting-guidelines-and-checklist-ehr-vendor

- Measure Specification and eCQM Standards Issues
  - o Strategy Options: The Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health IT (ONC) are working to improve the health of our nation by transforming care from a volume-based, provider-centered system to a patient-centered, learning health system. The eCQI Resource Center is a joint effort to bring together stakeholders from across the eCQI community and provide a centralized location for news, information, tools and standards related to eCQI and electronic clinical quality measures (eCQMs).
  - o Resources:
    - The ONC eCQI Resource Center is the one-stop shop for the most current resources to support Electronic Clinical Quality Improvement: https://ecqi.healthit.gov/
    - Evidence NOW. Heart of Virginia Health Care – Patient Outcome Measures Specifications "ABCS"

- EHR Versioning Issues
  - o Strategy Options:

- Providers should work with their vendors to plan for and resolve EHR versioning issues that may impact their ability to extract data for quality measurement. ONC's best resource that can help providers in this realm is the ONC Certified Health IT Product List. This is a comprehensive and authoritative listing of all certified Health Information Technology which has been successfully tested and certified by the ONC Health IT Certification program. All products listed on the CHPL have been tested by an Accredited Testing Laboratory (ATL) and certified by an ONC-Authorized Certification Body (ONC-ACB) to meet criteria adopted by the Secretary of the Department of Health and Human Services (HHS).
  - Resources:
    - ONC's Certified Health IT Product List (https://chpl.healthit.gov/#/)

- Provider Workflow Issues
  - Strategy Options:
    - Addressing provider workflow issues related to data extraction is very similar to overcoming general health IT implementation challenges. There are a massive amount of resources to assist providers and those who assist them with making changes to their workflow to enable better data capture for eventual data extraction. The following are just a few initial resources for providers, states, payers, and purchasers to consult.
  - Resources:
    - ONC Website for EHR Implementation Support https://www.healthit.gov/providers-professionals/get-ehr-implementation-support
    - Monitoring Health IT and EHR Goal Achievement – This tool is intended to aid providers and health IT implementers with Meaningful Use. It can be used to help measure the extent to which health information technology (HIT) or electronic health record (EHR) activities are adopted by intended users to determine if goals have been achieved. https://www.healthit.gov/providers-professionals/implementation-resources/monitoring-health-it-and-ehr-goal-achievement
    - ONC Practice Transformation Toolkit. April 18, 2014. https://www.healthit.gov/providers-professionals/implementation-resources/practice-transformation-toolkit

- Information Blocking Issues
  - Strategy Options:
    - States and others should begin by understanding the concepts and issues surrounding information blocking. ONC's report to Congress provides a strong starting point.
    - States have instituted or are pursuing policy options as a means of addressing information blocking, such as the State of Connecticut's 2015 information blocking law.
    - Providers can head off information blocking through savvy EHR contracting. There are several resources that can be used by providers to improve the ability for them to extract data from their EHR.
  - Resources:
    - ONC. "Report to Congress: Report on Health Information Blocking." April 2015. https://www.healthit.gov/sites/default/files/reports/info_blocking_040915.pdf

- ONC Health IT Certification Program: Enhanced Oversight and Accountability" FAQ
- ONC's Health IT Policy Levers Compendium (http://dashboard.healthit.gov/dashboards/state-health-it-policy-levers-compendium.php). This tool was developed in coordination with states to catalogue all policy levers that advance health IT interoperability. Key examples that are relevant for data extraction include:
  - Laws: CT data blocking law (https://www.cga.ct.gov/2015/act/pa/pdf/2015PA-00146-R00SB-00811-PA.pdf).
- EHR Contracts Untangled – Selecting Wisely, Negotiating Terms, and Understanding the Fine Print. September 2016. https://www.healthit.gov/sites/default/files/EHR_Contracts_Untangled.pdf
- Weststat. "EHR Contracts: Key Contract Terms for Users to Understand." June 25, 2013. Site: https://www.healthit.gov/sites/default/files/ehr_contracting_terms_final_508_compliant.pdf
- National Learning Consortium. "Contracting Guidelines and Checklist for Electronic Health Record (EHR) Vendor Selection." March 31, 2012. https://www.healthit.gov/providers-professionals/implementation-resources/nlc-contracting-guidelines-and-checklist-ehr-vendor

- Other Resources
  - ONC SIM Health IT Resource Center - Learning Event – Leveraging the EHR Certification Program for Clinical data extraction
    - https://www.healthit.gov/sites/default/files/data_extraction_le_final2016_1_26_01.pdf
  - CRISP eCQM Project Overview. November 2015.
    - https://www.osehra.org/sites/default/files/CRISP%20CQM%20Project%20Overview%2011%2012%2015.pdf
  - ETL Challenges Workshop Presentations – University of Colorado Denver.
  - Dziadkowiec, Oliwier; Callahan, Tiffany; Ozkaynak, Mustafa; Reeder, Blaine; and Welton, John (2016) "Using a Data Quality Framework to Clean Data Extracted from the Electronic Health Record: A Case Study.," *eGEMs (Generating Evidence & Methods to improve patient outcomes)*: Vol. 4: Iss. 1, Article 11.
    - DOI: http://dx.doi.org/10.13063/2327-9214.1201
    - Available at: http://repository.edm-forum.org/egems/vol4/iss1/11

Appendix J: Arkansas PCMH Survey: Practice Capacity to Extract, Report eCQMs

In Arkansas, nearly 200 primary care practices have embraced the state's Patient-centered Medical Home (PCMH) program and represent the marked transformation in healthcare delivery across the country. These medical homes work to measure and improve care through practice workflow redesign, Health Information Technology (HIT) optimization, improvements in quality indicators, and other transformation activities.

Measurement is an essential part of the PCMH transformation process and is used to guide the work, regardless of the quality improvement strategy a practice chooses, to ensure that appropriate care is being delivered while implementing high value care. Providers are required to meet quality targets to be eligible for shared savings payments. The medical homes in Arkansas work on a select set of nationally-endorsed quality indicators. Traditionally, metrics have relied on administrative process measures chosen for their convenience rather than their direct relationship to patient outcomes. The AR Medicaid PCMH program required practices to demonstrate capacity to extract 3 eCQMs (A1C >9, BP < 140/90, and BMI) by March 2016 as a program requirement with the expectation of using these metrics for accountability measures in early 2017 to qualify for shared savings.

To better understand the current state of information availability in PCMH practices, Arkansas Medicaid requested the Arkansas Foundation for Medical Care (AFMC) to survey PCMH primary care practices in Arkansas to determine barriers to extracting this quality indicator data from their Electronic Health Record (EHR). The goal was to identify if data extracting and reporting barriers exist, and the type of barrier, i.e., barrier within the EHR, barrier within the PCMH practice workflow, financial barrier to accessing reports or purchasing connectivity interfaces, or barrier due to lack of equipment/hardware.

Methods

Quality Specialists from AFMC's PCMH Practice Transformation (PT) team and from AFMC's Health Information Technology team contacted PCMH primary care practices to identify if a barrier or barriers exist that prevent the practice from being able to pull clinical quality data from their EHR on three select clinical quality measures (CQM):

1) Hypertension Control – NQF 0018 / CMS 165v3
2) Diabetes HgbA1c control – NQF 0059 / CMS 122v3
3) Child/Adolescent BMI – NQF 0024 / CMS 155v3

The AFMC Quality Specialists contacted the PCMH practices through email, telephone, and face-to-face visits depending on provider and clinical staff availability. In most instances, follow up communication or a visit to the practice was needed to further understand the existing barriers practices experienced and to coordinate the work with the EHR vendor technical support, both of which are essential to resolving EHR technology barriers.

Results

As the Practice Transformation team began surveying practices to determine if barriers to extracting select quality indicator data from the EHR system exist, practices that were experiencing problems with data retrieval and reporting most frequently said they didn't trust the data because it was inaccurate or that they could not generate a report with the required measure elements because of limitations within their EHR. However, as the teams continued to work with the practices and with the EHR vendors, many of the perceived EHR barriers was in reality a process workflow barrier. One clinic which uses McKesson as their EHR initially reported their concerns to the Specialist about the accuracy of the quality measure data being reported from the EHR. Through direct technical assistance the PCMH practice and the EHR vendor support team at McKesson, the problem was identified and a new process at the practice level was implemented. McKesson provided new documentation templates to the clinic. This barrier was initially identified as an EHR vendor barrier, but was later categorized as a process workflow barrier within the practice and subsequently resolved.

Onsite technical assistance augmented by virtual meetings is helping providers succeed with generating reports from their EHR systems and, when required, identifying a workaround solution to overcome barriers. The Specialists work directly with the EHR vendor support centers to address practice concerns and problems, and to pool needed resources to offer providers first class support.

Nearly all EHR vendors are actively working with the practices to resolve reporting barriers either by providing additional education or through future EHR software version updates. In many instances when a practice continues to experience a true EHR barrier and cannot generate a quality measure data report, a workaround to extracting the data has been found. However, the workaround at times can require significant clinic staff time and resources to successfully report the data, which may include manually counting measure numerator and denominator data or manually abstracting clinical data from non-interfaced systems such as laboratory systems.

There are noted exceptions to the above barrier resolutions or fixes. A few EHR vendors have placed limitations on some of the data reporting options within their EHR product, while others have not completed the necessary certifications of the EHR product versions, while still others have made the decision to exclude select CQMs from their EHR completely. An example is CureMD Corporation version 10g which was certified on 13 CQMs, however, HbA1c measure NQF 0059 was not one of them and, per the vendor, has no plans to make this measure available at this time. Another example is EHR vendor Medical Mastermind. It was reported by the practice using this EHR software that the vendor has been slow to respond with support and have indicated that reporting options for the latest CQM versions is not available.

Conclusion

Survey results indicate a majority of the PCMH primary care practices are capable of retrieving and reporting electronic clinical measures. EHR vendors such as Allscripts, e-MDs, and eClinicalWorks, all with a fairly large presence in primary care practices, were most often noted as not having barriers to

extracting clinical data and generating reports. Several practices using the well-known vendor NextGen have reported encountering barriers related to updated software versions, but these barriers appear to be temporary. However, some practices continue to experience barriers that generally fall into one of the following categories: EHR vendor barrier, practice workflow barrier, financial barrier, or equipment barrier. The figure below indicates the type of barrier and the number of PCMH practices with a particular barrier.
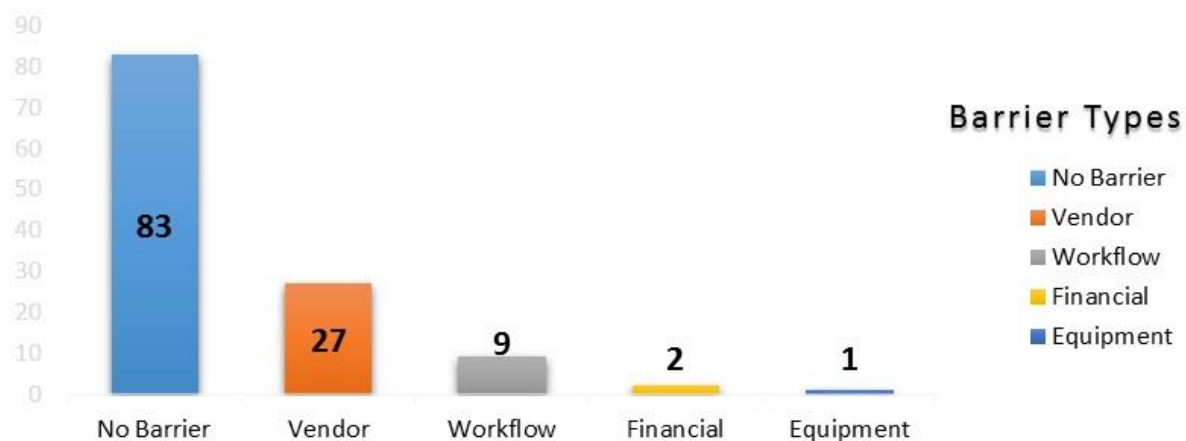
The most frequently noted barrier to successfully reporting on the measures to monitor blood pressure, diabetes and BMI is the EHR Vendor, followed by Practice Workflow Barrier. However, after further drill down into the survey results, and after working with the EHR vendor support centers, the impression is most EHR vendors are amenable to working with their customers to resolve reporting barriers, either through additional education, customized reports, or EHR version updates. In addition, many of the PCMH practices that have true EHR barriers are being assisted by AFMC PT Specialists to identify temporary workarounds to the barrier until the EHR vendor is able to roll out necessary fixes or updates to their product line. As healthcare providers in the state increasingly use their EHRs to manage the health of their patients and to meet federal, state, and other reporting requirements, it is apparent that providers will continue to draw upon the expertise and technical assistance the PT Specialists can provide to help mitigate extracting and reporting barriers.

Additional information from the survey suggests a few PCMH practices will be challenged to successfully report the select clinical quality measures. However, with assistance and support, it is expected that most of the PCMH practices experiencing problems now will be able to report these CQMs. Of most concern are the PCMH practices using Healthland (now owned by CPSI), Medical Mastermind, and Praxis EMR. These particular EHR vendors, at least initially, appear to lack an accessible, robust and responsive product support service.

Appendix K: State Summaries
Michigan

The Michigan Department of Health and Human Services (MDHHS) and the Michigan Health Information Network Shared Services (MiHIN) have developed the Clinical Quality Measurement Recovery and Repository service (CQMRR or 'skimmer') to enable any Medicaid-eligible Professional, Eligible Hospital or Critical Access Hospital to send CQMs in the form of QRDA files via MiHIN to MDHHS for State Medicaid Meaningful Use Stage 2 attestation credit. Providers can send the CQMs to MiHIN either via Direct Secure Messaging or via their Health Information Exchange.

The CQMRR service receives, validates, quality-checks, organizes, and restructures inbound CQM files submitted by healthcare providers. CQMs submitted for the purpose of Meaningful Use attestation are forwarded to the State of Michigan for Meaningful Use evaluation and for analysis and comparison. The CQMRR service is not just limited to Medicaid or Meaningful Use attestation, however - any providers or payers in any state can use and benefit from the CQMRR service developed by MiHIN without requiring any development of their own solution.

A healthcare organization using the CQMRR service to submit or receive CQMs can use the service's display and reporting tools to create and view reports and dashboards using the CQMs they submitted including inter- and intra-clinical comparisons and virtually any other displays of trends and patterns in clinical quality. This can help identify opportunities for quality improvement that can lead to better outcomes and positively impact population health.

The CQMRR service was not initially built to calculate quality measures from submitted data. However, the service is being enhanced with these capabilities with a scheduled rollout of FY2017. These calculations are initially planned to combine data from multiple sources starting with QRDA and C-CDA formats to allow for the most comprehensive and correct quality calculations possible.
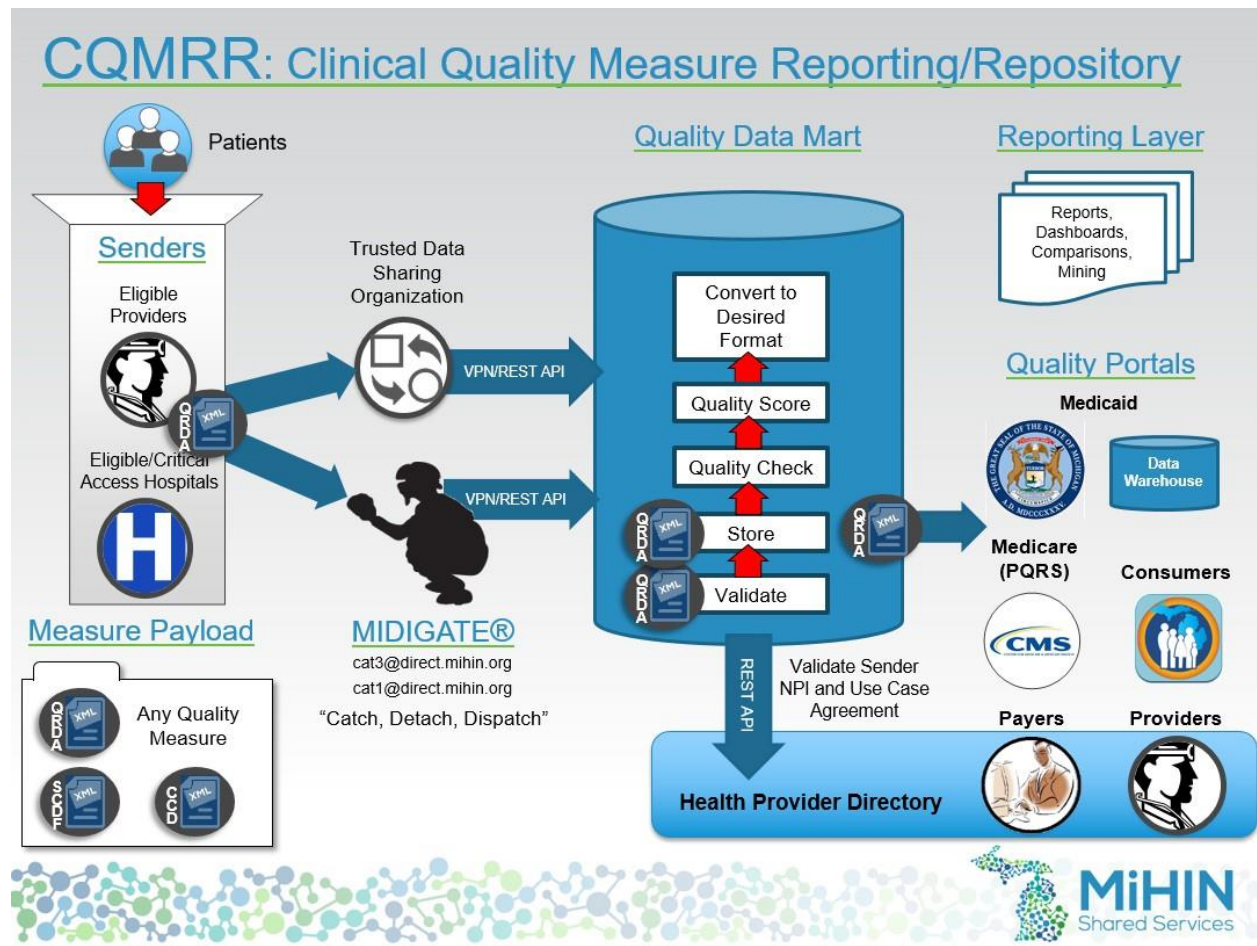
Measure Alignment

Michigan and its state designated entity for HIE, MiHIN, developed a system that allows clinical quality measures to be sent electronically through the MiHIN's Clinical Quality Measure Reporting and Repository (CQMRR) service. This allows providers to send measure information directly from their EHRs. Providers can currently send Category 3, or aggregate measure data. MiHIN looks to accept Category 1, or individual measure, files later in the year. The MiHIN Clinical Quality Measures Implementation Guide provides a use case for providers electronically submitting for Medicaid and Meaningful Use attestation, or non-Medicaid providers wanting to report eCQMs for quality improvement.

State Quality Measurement Link(s)

- Michigan Quality Improvement Consortium: http://mqic.org/
- Michigan Health Information Network (MiHIN): https://mihin.org/
  - MiHIN Clinical Quality Measures Implementation Guide: https://mihin.org/wp-content/uploads/2013/07/MiHIN-UCIG-Clinical-Quality-Measures-PUBLISHED-v28-05-18-16.pdf
  - MiHIN Announcement for Clinical Quality Reporting: https://mihin.org/wp-content/uploads/2016/05/MiHIN-Announcement-for-Clinical-Quality-Measures-v5-05-09-16.pdf
  - https://mihin.org/cqms/

Figure 7 MiHIN CQMRR Data Flow Overview

Oregon

Quality Measure Alignment

Oregon has identified over 80 potential measures of cost, quality, access, patient experience, and health status that could be tracked over delivery settings and populations. These measures come from several measure sets, including the CMS Adult Medicaid Quality Measures, Children's Health Insurance Program Reauthorization Act (CHIPRA) Measures, Oregon's core performance measures, and the incentive measures for year one selected by the Metrics and Scoring Committee that will be tied to quality pool funding for CCOs. These measures by set are listed below.

Health IT-enabled Quality Measurement Summary

Oregon Health Authority is developing a clinical Quality Metrics Registry to support state quality reporting programs, such as the Coordinated Care Organization (CCO) Incentive Measures Program and the Medicaid EHR Incentive Program. This registry aims to create standards and automatic capacity for collection, storage, and data aggregations of metrics across Oregon. Additional details regarding the registry can be found on the Oregon Health IT Program: Clinical Quality Metrics Registry pdf copied below.

State Quality Measurement Link(s)

- Oregon Health Measurement Strategy:
  http://www.oregon.gov/oha/analytics/MetricsDocs/MeasurementStrategy.pdf
- Oregon Office of Health Analytics, Metrics and Scoring Committee:
  http://www.oregon.gov/oha/analytics/Pages/Metrics-Scoring-Committee.aspx
- Oregon's Health IT Program: Clinical Quality Metrics Registry:
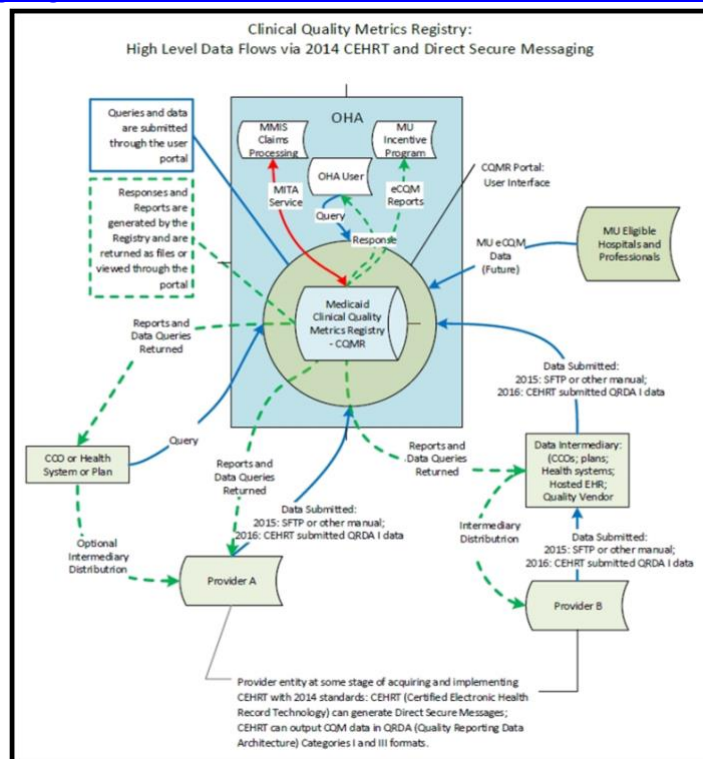 https://www.oregon.gov/oha/OHIT/resourceDocuments/CQMR%20Overview.pdf

Figure 8 Oregon Clinical Quality Metrics Registry

Vermont - Blueprint for Health

In 2015, Vermont's Blueprint for Health (Blueprint) partnered with ACOs to develop a unified approach to data collection and reporting, and acquired the Blueprint Clinical Registry from the former state vendor. Vermont also merged all-payer claims data with clinical and complementary data from state partners, such as substance abuse and corrections data. The Blueprint also developed more comprehensive and timely performance reports for providers and for internal monitoring and evaluation.

The Blueprint developed a process for aggregating data from clinical sources, the clinical registry, and from the state's APCD, Vermont health Care Uniform Reporting and Evaluation Systems (VHCURES). After analysis for completion, de-identification[82], and linkage of individual's clinical records in the registry and VHCURES, Blueprint's analytics vendor, Onpoint, determines which portion of the population can be assessed using claims, as shown in the figure below.
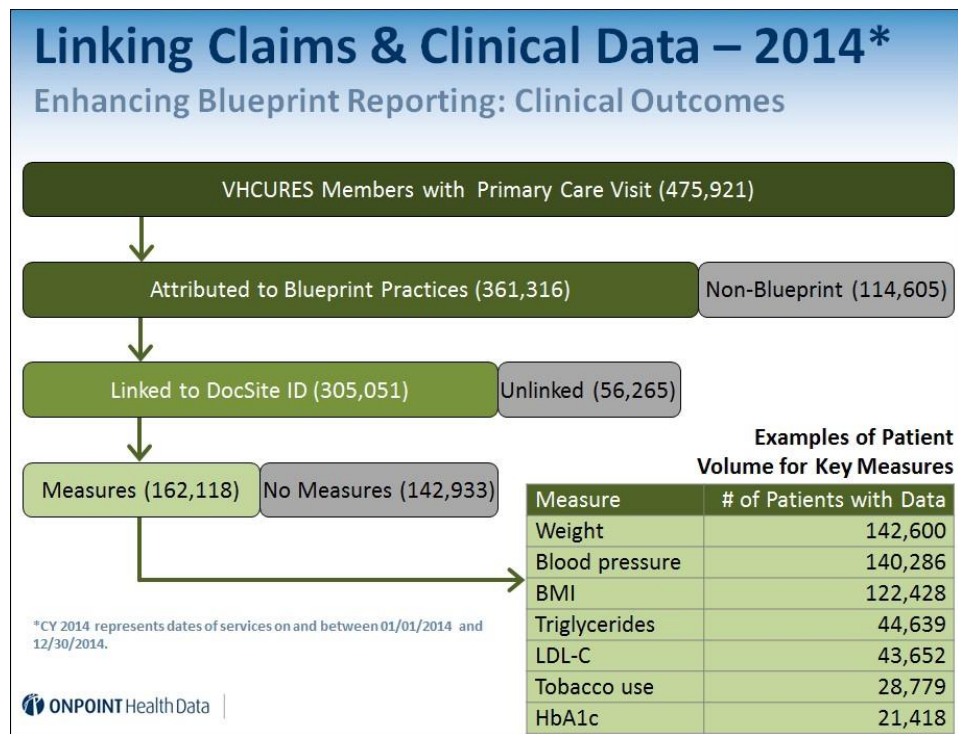

Figure 9 Blueprint - Claims & Clinical Data - 2014

The population for analysis continues to increase each month, which shows Blueprint's success connecting state systems. Data collected can be used for population health and cost comparison analysis, and can provide continuing guidance for quality improvement initiatives.
Additional information can be found in Vermont's Blueprint for Health, 2015 Annual Report.[83]

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[82] VHCURES data is deidentified.
[83] http://www.leg.state.vt.us/jfo/healthcare/Health%20Reform%20Oversight%20Committee/2015%20Interim%20Reports/Vermont%20Blueprint%20for%20Health%202015%20Annual%20Report%20FINAL%201-27-16.pdf
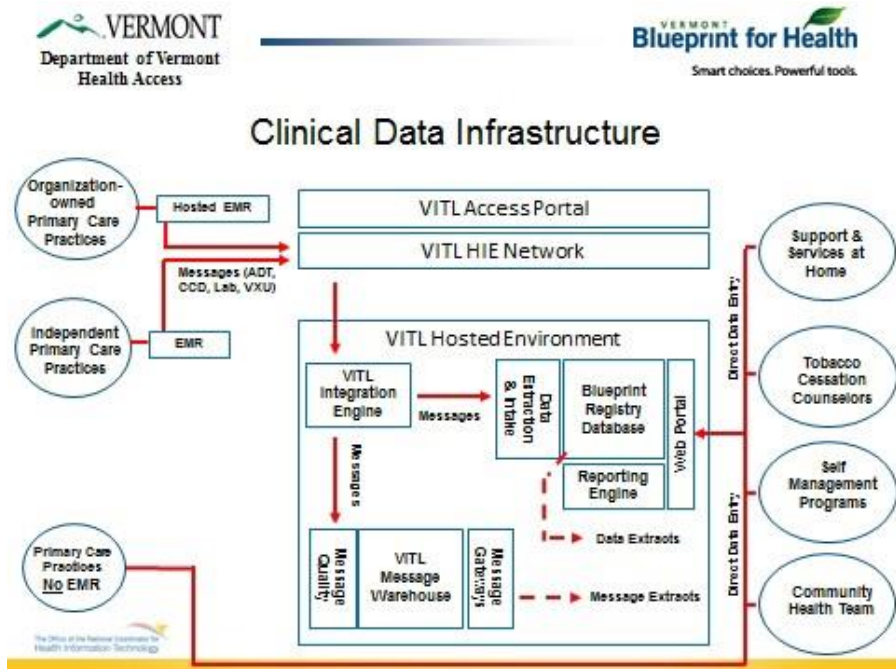
Technical architecture/data flow:

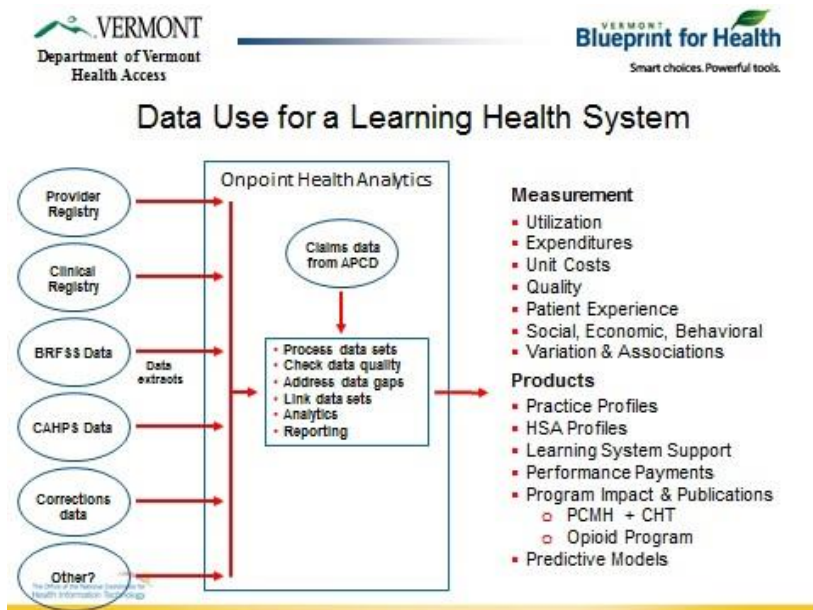
Figure 10 Blueprint Clinical Data Infrastructure

Figure 11 Blueprint for Health Data Use for a Learning Health System

State Quality Measurement Link(s)

- Department of Vermont Health Access: http://ovha.vermont.gov/
- Vermont 2015 Blueprint Annual Report (published January 31, 2016):
  http://blueprintforhealth.vermont.gov/reports_and_analytics

Appendix L: Additional Resources

ONC Materials

- State Engagement on the Interoperability & Exchange Roadmap Summary and Findings
- Strategic Implementation Guide on Provider Directories [PDF - 1.5 MB]
- http://ainq.com/inquiry/wp-content/uploads/2016/06/ai_health_it_framework.pdf
- Office of the National Coordinator "State Innovation Model Resource Center" Electronic Clinical Quality Measure Resources Tab; https://www.healthit.gov/providers-professionals/state-innovation-model-health-it-resource-center

CMS Materials

- Centers for Medicare and Medicaid Services 2016 Physician Quality Reporting System (PQRS) How to Get Started? https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/PQRS/How_to_Get_Started.html
- Centers for Medicare and Medicaid Services, How to Report Once for Medicare Quality Programs, June 2016. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/PQRS/Downloads/2016HowtoReportOnce.pdf

eCQM Topic Areas:
Policy / Finance / Governance Resources:

- Claims and Clinical Data Integration: All Payer Claims Data [PDF - 3.2 MB]
- Accountable Oversight and Rules of Engagement for APM Data Infrastructure [PDF - 1.4 MB]

Legal Resources (combined with above)

- Meaningful Consent for Patients in Electronic Health Information Exchange
- https://www.healthit.gov/buzz-blog/privacy-and-security-of-ehrs/examining-oversight-privacy-security-health-data-collected-entities-not-regulated-hipaa/
- https://www.healthit.gov/sites/default/files/non-covered_entities_report_june_17_2016.pdf

Information Flow and Data Extraction Resources

- Developing and Testing a Data Management Model and Maturity Scale Tailored to Improving Patient Matching Accuracy [PDF - 749 KB]

Quality Measurement Technical Architecture Resources

- The Core Quality Measures Collaborative Background - led by the America's Health Insurance Plans (AHIP) and its member plans' Chief Medical Officers, leaders from CMS and the National Quality Forum (NQF), as well as national physician organizations, employers and consumers, worked to reach consensus on core performance measures. Through the use of a multi-stakeholder process, the Collaborative promotes alignment and harmonization of measure use and collection across payers in both the public and private sectors. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/Core-Measures.html

Quality Measurement to Support Alternative Payment Models Resources:

- Office of the National Coordinator. "Health IT Enabled Quality: A Vision to Achieve Better Health and Health Care" https://www.healthit.gov/sites/default/files/HITEnabledQualityImprovement-111214.pdf
- Center for Medicare and Medicaid Services – "Health Care Payment Learning and Action Network" https://innovation.cms.gov/initiatives/Health-Care-Payment-Learning-and-Action-Network/
- Health care Payment Learning & Action Network – Mission: To accelerate the health care system's transition to alternative payment models by combing the innovation, power, and reach of the private and public sectors. https://hcp-lan.org/
- Brookings Institute Health Policy Issue Brief "Medicare Physician Payment Reform: securing the Connection Between Value and Payment" January 2015 http://www.brookings.edu/~/media/research/files/papers/2015/01/012715-medicare-physician-payment-refom-web.pdf
- Consensus Core Set: ACO and PCMH / Primary Care Measures Version 1.0 https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/Downloads/ACO-and-PCMH-Primary-Care-Measures.pdf
- ☐ Center for Medicare and Medicaid Services "Notice of Proposed Rulemaking Medicare Access and CHIP Reauthorization Act of 2015. Quality Payment Program https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/MACRA-MIPS-and-APMs.html

Measure Alignment Resources:

- Buying Value Coalition toolkit can assist states build measure set; Online Measure Selection Toolkit http://www.buyingvalue.org/wp-content/uploads/2014/11/6-Buying-Value-Measure-Sets-to-Identify-and-Review.pdf
- CQM measure alignment tool - Medicaid EHR Team (MeT) - *(log-in required)* http://www.medicaidhitechta.org/ResourceLibrary/ProgramImplementationToolkit/Pathway1/5Checklist,TipSheetsandOtherAidstoStates.aspx
- Health Affairs Blog – Patrick Conway, CMS - http://healthaffairs.org/blog/2015/06/23/the-core-quality-measures-collaborative-a-rationale-and-framework-for-public-private-quality-measure-alignment/
- Catalyst for Payment Reform – Employer-Purchaser Guide to Quality Measure Selection http://www.catalyzepaymentreform.org/how-we-catalyze/purchaser-strategy-and-tools/80-how-we-catalyze/134-evaluating-payment-reform
- Consensus Core Set: ACO and PCMH / Primary Care Measures Version 1.0 https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/Downloads/ACO-and-PCMH-Primary-Care-Measures.pdf