U.S. Department of Health and Human Services
Office of the National Coordinator for Health Information Technology

Quality

Detailed Use Case

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1.0 Introduction

The Institute of Medicine (IOM) defines Quality as "the degree to which health services for individuals and populations increase the likelihood of desired outcomes and are consistent with current professional knowledge" (IOM, 1990). The American Health Information Community (AHIC) has identified and prioritized several health information technology (HIT) applications, or "breakthroughs," that could produce a specific tangible value to health care consumers. To address one of these breakthrough areas, the Quality Workgroup was formed and given a broad charge of making recommendations to the AHIC on how health information technology can: 1) provide the data needed for the development of quality measures, 2) automate the measurement, feedback and reporting of a comprehensive and future set of quality measures, 3) accelerate the use of clinical decision support (CDS) to improve performance on these quality measures, and 4) how performance measures should align with the capabilities and limitations for HIT.

While the Quality Workgroup works to meet its broad charge, this use case focuses on the capabilities and functionality needed to measure and report on hospital and clinician quality and the use of quality measures to support clinical decision making in an interoperable healthcare system. Currently quality measurement is often labor-intensive, and involves the reporting of disparate measures to numerous requesting organizations, resulting in information that is not consistent across reporting entities. Consumers are still seeking useful, relevant information with which to make informed choices about their healthcare. While there are organizations today that have made significant progress in reaching consensus on what to measure, the maturation of electronic health records (EHRs) and the spread of EHR adoption creates a unique opportunity to automate, where possible, the measurement, feedback and reporting of healthcare quality.

Consumers could benefit from the measurement, feedback and reporting of hospital-based healthcare quality such as the measures supported by the Hospital Quality Alliance (HQA) and of physician quality, such as the measures supported by the AQA (formerly known as the Ambulatory Quality Alliance), particularly if this information can be integrated into EHR systems within the provider's workflows. Providers may benefit from receiving near-real time feedback regarding quality measurement. Additionally, quality data across multiple providers and entities could be aggregated for the purposes of improving community health, promoting transparency in healthcare, and providing better information regarding the quality and value of healthcare services.

1.1 Use Case Description

In January 2007 the AHIC approved a recommendation to develop a use case that captures the integration of data to support quality measurement, feedback and reporting into EHRs, begins to use quality measures to support clinical decision making, and allows for the aggregation of quality information across multiple providers and entities to support public

reporting of healthcare quality. The recommendation included the following AHIC prioritized needs:

- Hospital-based quality measures (core set):
    - Automate data capture and reporting of HQA measures through EHRs in support of provider workflows; and
    - Communicate HQA measure data to external entities.
- Clinician-level measures (core set):
    - Automate data capture and reporting of AQA measures through EHRs in support of provider workflows; and
    - Communicate AQA quality measure data to external entities for aggregation and reporting.
- Feedback to Clinicians (self-assessment):
    - Enable real-time or near-real time feedback to clinicians regarding specific quality indicators which are relevant for a particular patient. This may occur through event detectors in EHRs that identify significant variances in practice. In order to be meaningful, such event detectors should be based on evidence-based practice guidelines, and driven by clinical information about the patient. If coupled with automated collection of adherence, non-adherence and exclusion criteria, both delivery of high quality care and quality reporting could be enabled as part of the decision-making process; and
    - Enable provision of tailored performance information to clinicians on quality measures for specific patient groups.
- Public Reporting:
    - Aggregate data across multiple sources (claims data, medication data, laboratory data, etc.) to support quality measurement, promote accountability among providers, and aid consumers in making informed choices; and
    - Communicate quality measurement data quickly and clearly in a manner that makes it useful to a wide variety of decision makers, patients, healthcare providers, payers, health plans, public health organizations, health researchers, and regulators who are involved with this process.

This use case has been developed by the Office of the National Coordinator for Health Information Technology (ONC), with opportunities for review and feedback by interested stakeholders within both the private and public sectors. To facilitate this process, the use case is being developed in two stages:

- The Prototype Use Case, which describes the flows of the use case at a high level and facilitates initial discussion with stakeholders; and
- The Detailed Use Case, which documents all of the events and actions within the use case at a detailed level.

This document is the Detailed Use Case. Comments on the draft detailed use case have been considered and incorporated where applicable into this document. Additional changes have been made to provide greater clarity and detail with respect to the flow of quality measurement data for feedback and public reporting.

1.2 Scope of the Use Case

Widespread adoption of EHRs is a goal of the national HIT agenda. To achieve this, the AHIC Quality Use Case focuses on: 1) the impact that collection of electronic health information through an EHR has on driving quality of care through better, more comprehensive clinical information at the point of care; 2) measuring and reporting quality with a minimum of burden assessed on the provider; and 3) the aggregation of health information for the purpose of public reporting of quality. This use case depicts two scenarios related to quality measurement, feedback and reporting with respect to a patient's encounter with the healthcare delivery system: quality measurement of hospital-based care and of care provided by clinicians.

This use case assumes the presence of EHRs within the health care delivery system and promotes the development of longer-term efforts.

The use case models the exchange of information between the EHR and the quality measurement, feedback and reporting systems. The use case allows for a hybrid model of data collection, where claims and or manual data collection will be required to support certain measures that are not supported through EHRs. This use case acknowledges the need to include a combination of claims and clinical (e.g., EHR) data. EHR data could be extracted for these patients to provide a richer measure set, with more automation. However, the use case acknowledges that manual review and processing will continue to be required in many contexts and settings.

This use case does not attempt to prescribe a definitive approach to the location of data aggregation. The use case does describe roles for these processes which may be fulfilled in several different settings. The use case also does not describe harmonized quality measures. Separate AHIC processes will determine the initial and subsequent quality

measures to be used. The data flows indicated are not intended to be comprehensive or limiting.

2.0 Use Case Stakeholders

Figure 2-1. Quality Use Case Stakeholders Table

Stakeholder	Working Definition
Ancillary Entities	Organizations that perform auxiliary roles in delivering healthcare services. They may include diagnostic and support services such as laboratories, imaging and radiology services, and pharmacies that support the delivery of healthcare services. These services may be delivered through hospitals or through free-standing entities.
Clinicians	Healthcare providers with patient care responsibilities, including physicians, advanced practice nurses, physician assistants, nurses, and other credentialed personnel involved in treating patients.
Consumers	**Members of the public who may, or may not, be actively receiving healthcare services. These individuals may include: caregivers, patient advocates, surrogates, family members, and other parties who may be acting for, or in support of, a patient in the activities of receiving healthcare.**
Government Health Care Agencies	Agencies that have programs at the local, state or federal level that are involved with the delivery and/or regulation of healthcare.
Healthcare Delivery Organizations	Organizations such as hospitals and physician practices that manage the delivery of care. They may also include institutional providers of healthcare such as ambulatory surgical centers and public health department immunization clinics.
Health Information Exchange (HIE)	A multi-stakeholder entity that enables the movement of health-related data within state, regional, or non-jurisdictional participant groups.
Health Information Management (HIM) Personnel	Personnel who manage healthcare data and information resources, encompassing services in planning, collecting, aggregating, analyzing, and disseminating individual patient and aggregate clinical data
Health Information Technology System Developers	Organizations, or parts of organizations, that provide HIT solutions such as EHR applications, data repositories, web services, etc.
Healthcare Payors	Insurers, including health plans, self-insured employer plans, and third party administrators, providing healthcare benefits to enrolled members and reimbursing provider organizations. As part of this role, they provide information on eligibility and coverage for individual consumers. Case management or disease management may also be supported.
Healthcare Purchasers	Entities, such as employers, that purchase healthcare for the beneficiaries for which they are responsible.
Health Researchers	Those performing research using healthcare information.
Processing Entities	Organizations which collect, aggregate and process healthcare information for primary or secondary use. In this use case, processing entities deal with quality information. Examples include but are not limited to clearinghouses, Joint Commission-contracted Performance Measurement System vendors, and regional health information exchange organizations.
Public Health Agencies (local/state/federal)	Federal, state, local organizations and personnel that exist to help protect and improve the health of their respective constituents.

Stakeholder	Working Definition
Quality Organizations	Public/private organizations active in the healthcare quality measurement enterprise. These organizations include entities which set priorities, endorse measure sets, harmonize quality measures across settings, establish guidelines for collection and reporting, and support quality improvement. Examples of various quality organizations include the National Quality Forum (NQF), Hospital Quality Alliance (HQA), AQA, The Joint Commission, Centers for Medicare and Medicaid Services (CMS), the National Committee for Quality Assurance (NCQA), Quality Improvement Organizations (QIOs) and specialty medical boards.

3.0 Issues and Obstacles

Realizing the full benefits of HIT and its potential to enable quality measurement, feedback and reporting is dependent on overcoming a number of issues and obstacles in today's environment. Inherent in this use case is the premise that some of the issues and obstacles in today's environment will be addressed through health information technology standardization and harmonization activities, policy development, and other related initiatives.

Data Interoperability and Standards

Lack of standardized quality measures. The healthcare industry needs to reach consensus on a baseline group of standardized quality measures. Significant effort is now being invested by many quality organizations to reach this goal.

Lack of standardized electronic patient information. There is limited standardization of EHRs, and EHRs are often customized during implementation, resulting in a lack of detailed, standardized implementation specifications for collecting data pertaining to quality metrics in an EHR. Also, local practice often drives the documentation process, and as a result standardization of what is documented and where it is documented is inconsistent. Additionally, clinical documentation is often unstructured and uses non-standardized nomenclature, with no standards for many important data elements. The lack of established standards for structured clinical documentation makes it difficult to easily retrieve data from many EHR systems currently being used.

Lack of standardized EHR functionality for quality measurement purposes. EHR implementation specifications are not optimized for data collection to occur through electronic health records. Specifications are not currently created in a way that a vendor could universally adopt to automate quality reporting. Additionally, consistency and a level of standardization is required in the incorporation of measure specifications into EHRs, in order to ensure consistency in both the recording and output of EHR data for purposes of quality measurement.

Data Ownership, Sharing, & Responsibility

Lack of uniform operating rules and standards for the sharing, aggregation and storage of quality data. There are limited coordinated strategies for collecting, aggregating, analyzing and reporting healthcare quality information across both the private and public sectors. Additionally, the proliferation of multiple regional efforts to collect and report quality data is resulting in uncoordinated demands of providers for quality measurement data, increasing the burden on providers and compromising comparability of results.

Stewardship of aggregated data. Consensus must be established on managing and storing aggregated patient-indexed data; stewardship issues for the data must be considered and

resolved. Comprehensive HIE relies heavily on resolution of a variety of data stewardship issues, such as data access – determine who should access data, establish use limitations and appropriate business rules; data aggregation – determine required characteristics of aggregators, transparency of aggregation process, ownership of aggregated data, and liability and market considerations; data analysis – establish data analysis rules and standards, indicating specific statistical techniques where appropriate; data collection – determine policies, rules and standards for collecting data from a variety of sources from public and private stakeholders; data sharing and reporting – develop guiding principals for public reporting and reporting back to stakeholders; and data validation – establish policies, rules and standards of audits to ensure validity of data.

Confidentiality, Privacy and Security

In the envisioned state of automated quality measurement and reporting, access to personal health information from EHRs needs to be accomplished in a confidential and secure manner that complies with privacy requirements and respects consumer decisions regarding access to their information. Personal health information must be appropriately secured whenever it is stored, transmitted, or disposed of by any person or entity authorized to access, collect, maintain, use and disclose that information.

Limited EHR penetration

EHRs are necessary to help automate quality reporting and clinical decision support. While adoption of EHRs have been shown to increase over time, limited penetration overall can impede automation of quality measurement and clinical decision support capabilities.

Lack of integration into provider workflow

EHRs do not always support efficient data capture and reporting or providing clinicians with non-burdensome methods of using quality data in support of patient care. The electronic capture of health quality information has not been consolidated into a provider's workflow or into the EHR workflow in such a way as to minimize clinician burden in measurement, feedback and reporting of quality.

Challenges in attribution of accountability to individual clinicians

There is a lack of consensus regarding which aspects of care should be attributed to individual physicians compared to those that may be shared within a healthcare organization, multi-specialty group or physician practice. In cases where patients require treatment from multiple providers, the ability to link a patient's quality of care to one specific provider over the course of the patient's care and treatment is difficult.

4.0 Use Case Perspectives

The Quality Use Case describes the flow of quality information through an EHR system for the purpose of quality measurement, feedback and reporting, and describes several perspectives. Each perspective represents the exchange of quality information from the viewpoint of the major stakeholders involved in the measurement, feedback, and reporting of hospital and clinician quality. Quality information is collected at the point of care through an electronic health record system, and transmitted via secure data exchange at a patient-level initially and subsequently aggregated to either hospital level or clinician level for public reporting purposes.

Each perspective represents a role consistent with a set of events and actions that occur in order to measure and report quality information. An individual organization or entity may fulfill one or more than one role, and a single role may, at times, be filled by multiple organizations. This use case describes capabilities necessary to support the information flows associated with healthcare quality measurement, feedback, and reporting.

Within the scope of the use case noted above, the following perspectives have been defined:

- *Hospital-based Care*

Hospital performance is currently evaluated by the widespread collection and reporting of nationally supported HQA measures. This perspective describes the flow of quality information necessary to calculate a hospital quality measure, where information flows through an EHR at a hospital when a patient is seen for care and treatment. Hospital quality measures are generally “system” measures, where the hospital is the entity accountable for ensuring quality care is delivered. Included in this perspective are functions that are, at times, carried out on behalf of hospitals through organizations (e.g., Performance Measurement System vendors) contracted to support the collection and analysis of patient-level quality information for both internal purposes as well as preparation for submission to external entities.

- *Clinicians*

AQA measures have been established to measure physician performance, and may expand to include other clinicians as well. AQA measures include care provided by clinicians in institutions, but are specifically designed to measure the care provided by an accountable physician. This perspective describes the flow of quality information through an EHR whenever a specific physician can be identified as accountable for ensuring adherence to best practice. The terms “clinician” and “clinician practice” are used throughout this use case to represent physicians, group practices and multi-specialty groups, as well as any other clinicians for whom quality measures are developed and implemented. This perspective focuses on how information may be captured through EHRs to facilitate the measurement, feedback and reporting of AQA measures and is not meant to address the

policy issues surrounding attribution of accountability for quality measures. Within this perspective, patient-level data are used to calculate clinician-level quality measurement. In many cases, information may be linked across various payors in order to have sufficient information on performance. Today, clinician measurement occurs primarily through claims data. This perspective includes the merging of claims and clinical data, to support quality measures dependant on a broader information base.

- *Information Exchange*

Quality information may be exchanged in a number of ways, and by various entities such as clearinghouses, regional health information organizations (RHIOs), etc. The information exchange may occur through direct transmission of quality information from hospitals or clinicians to a measurement and reporting entity. Alternatively, quality information may be exchanged through health information exchanges. Today various "value exchanges" such as the expansion of current AQA pilot sites are testing approaches to aggregating and exchanging health information at local and regional levels enabling the collection of longitudinal patient data and improving measurement, feedback and reporting through exchange of richer data sets. The use case acknowledges that HIE does not principally occur today in hospital quality reporting.

- *Multi-hospital and Multi-entity Measurement and Reporting*

These perspectives describe the processes included in collecting data from a number of sources and repositories, and may include matching patients across data sources and aggregating these data to better measure quality. Comparative information on many hospitals or clinicians may then be reported out for multiple purposes. The Multi-Hospital and Multi-entity Measurement and Reporting entities, such as the Joint Commission or CMS may perform all or part of these services. Health Information Service Providers are another possible example of such an entity, particularly if they play a central collection and processing role. Although information received within this perspective may be patient-level identifiable data, information flowing out will typically be aggregated, de-identified data. Organizations serving the role of Multi-hospital or Multi-entity Measurement and Reporting will be governed by appropriate data stewardship responsibilities.

5.0 Use Case Scenarios

Today, measuring quality of care is accomplished by measuring hospital performance and physician performance through HQA and AQA measures respectively. For the purpose of this use case, two scenarios are used to depict the information flows of data needed to measure and report quality of hospitals and clinicians, recognizing that AQA measures may expand beyond physicians over time (e.g., Physician Assistants, Nurse Practitioners).

5.1 Hospital-based Care

This scenario covers the documentation, collection, transmission and feedback of patient information relevant to the calculation of an established quality measure, when care is provided to a patient within a hospital setting. The events and actions within this scenario relate to the measurement, feedback and reporting of quality information related to hospital performance, and may include care provided in hospital-based outpatient departments, Emergency Departments and hospital-based clinics.

5.2 Clinicians

This scenario covers the documentation, collection and transmission of patient information relevant to the calculation of an established quality measure for clinician quality, where a specific clinician can be identified as responsible for ensuring adherence to best practices. Examples include measurement of clinician performance in both inpatient and outpatient settings, including but not limited to physician offices, emergency departments, or surgical settings.

6.0 Hospital-based Care Quality Information Collection and Reporting

Figure 6-1. Hospital-based Care Quality Information Collection and Reporting Flow

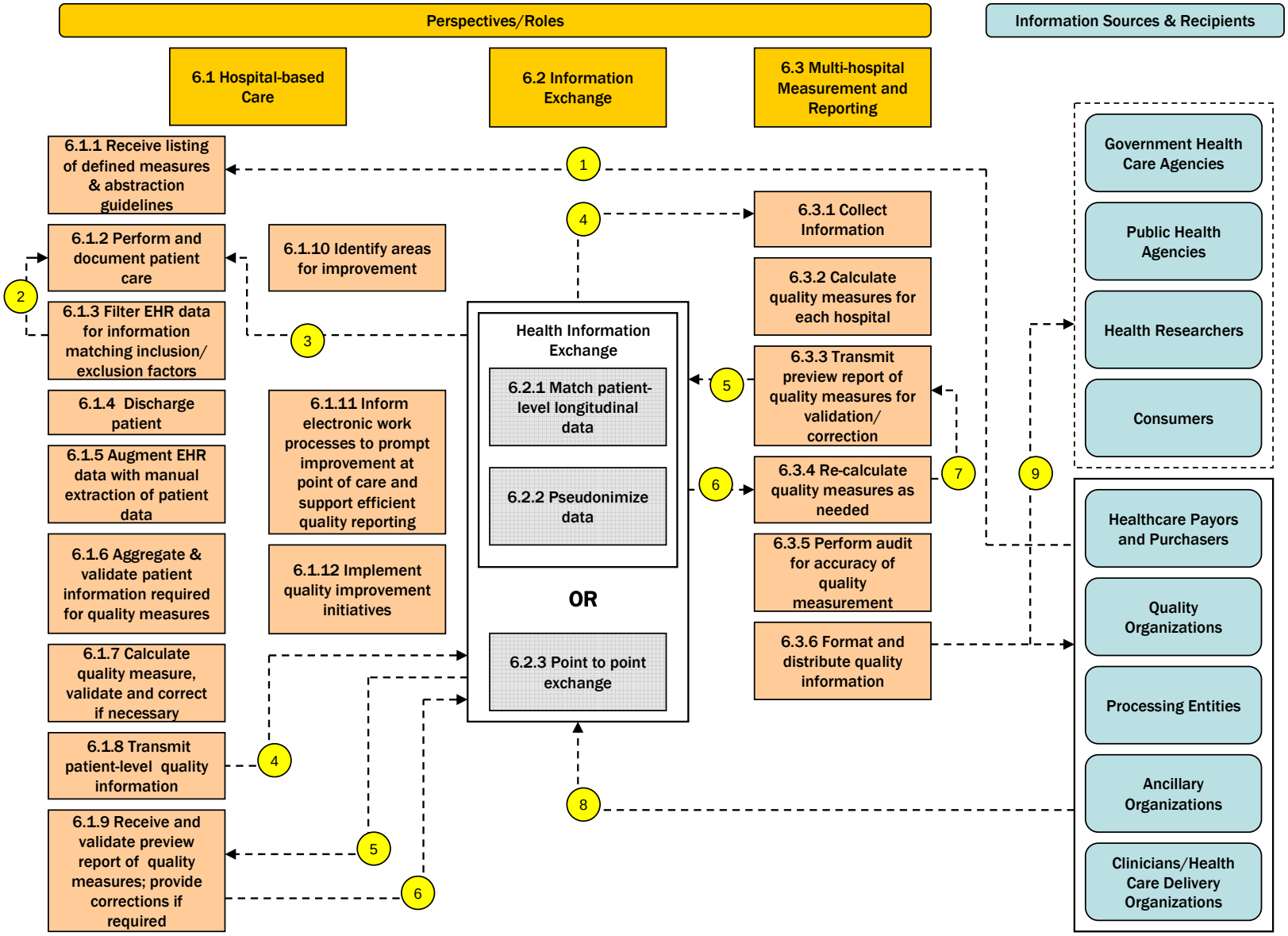


Figure 6-2. Hospital-based Care Quality Information Collection and Reporting Scenario Flows

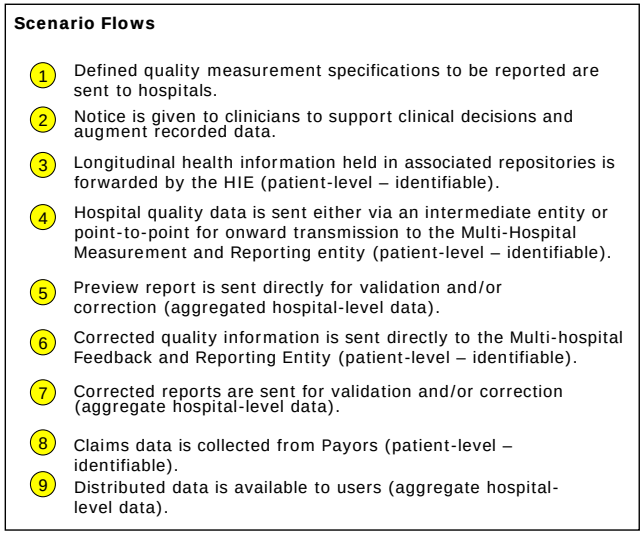


Figure 6-3. Hospital-based Care Quality Information Collection and Reporting, Hospital-based Care Events and Actions Table

Code	Description	Comments
6.1.1	**Event:** Receive listing of defined measures & abstraction guidelines	
6.1.1.1	**Action:** Hospitals receive the listing of quality measures and detailed measure specifications for how a quality measure will be calculated.	Detailed measure specifications that define numerator, denominator, algorithm, etc. for calculation of measure are provided to the hospitals, in addition to abstraction guidelines that provide standard instruction on what types of patient information should be abstracted from the patient record. A generalized process is described in Appendix A 1.0: Provisioning for Secondary Use.

Code	Description	Comments
6.1.1.2	**Action:** Hospitals identify applicable measures and incorporate into EHR where possible.	Hospitals determine which measures apply and select the measures which they will manage and report. Standardized technical specifications for these defined quality measures are incorporated in a consistent way into the EHR, in order to automate data capture and reporting of quality measurement data where possible and support manual abstraction where necessary. Validation testing may be done to ensure that the data gathering process accurately meets the measure specifications and technical data specifications.
6.1.2	**Event:** Perform and document patient care	
6.1.2.1	**Action:** Clinical personnel treat the patient's injuries or illness. The patient is assessed and observations are documented; appropriate diagnostics and treatments are ordered and completed. Clinical information is entered into the patient's EHR.	The clinician evaluates the patient, considers a presumptive diagnosis and identifies clinical problems that may drive care and treatment. Observations are documented, and relevant diagnostics and treatment are ordered. To the extent possible, information entered into the EHR is standardized and/or structured, and provides the level of detail needed to satisfy the data requirements of relevant measure specifications. Depending on the level of clinical decision support available, standardized order sets, computerized alerts and reminders, and clinical guidelines may be made available to the clinician.
6.1.3	**Event:** Filter EHR data for information matching inclusion/ exclusion factors	
6.1.3.1	**Action:** Based on the defined measure specifications and associated technical specifications incorporated into the EHR workflow, the patients relevant for each "denominator" (a case relevant to include for a particular quality measure) are identified using information available. If the information is present, the patient is identified as eligible for the measure, based on inclusion criteria.	Once a patient is deemed as possibly eligible for a quality measure, interventions and processes may be evaluated to determine which established processes as defined by quality measures were followed. For example, if a patient presents to the hospital with an Acute Myocardial Infarction (AMI), he or she is eligible for consideration in a number of quality measures applicable to care and treatment of an AMI patient.
6.1.3.2	**Action:** Based on documentation entered by the clinician, the data are filtered by exclusion criteria for each case identified as eligible for a quality measure.	For patients who are identified as eligible for a quality measure, there may be contra-indications that would exclude that patient from being included for a particular quality measure. For example, although administration of a beta-blocker is recommended in AMI patients (and for which there is a quality measure defined to determine whether recommended treatment is followed) a patient may be excluded due to presence of a contra-indication, such as a history of asthma.

Code	Description	Comments
6.1.4	**Event:** Discharge patient	
6.1.4.1	**Action:** Once treatment is complete, the patient is discharged. Additional data may be extracted from the patient record to inform the quality measure.	Appropriate additional information is entered into the EHR by the clinical staff, closing the patient encounter. Discharge diagnosis and treatment details are available for consideration in quality measurement.
6.1.5	**Event:** Augment EHR data with manual extraction of patient data (may also occur prior to discharge)	
6.1.5.1	**Action:** Information related to a quality measure that is not automated through an EHR or other system is manually extracted from the patient record.	Outstanding information required to complete the specification requirements for the quality measure that is not codified within an EHR, is manually extracted from the EHR or paper-based records by hospital personnel.
6.1.6	**Event:** Aggregate and validate patient information required for quality measures	
6.1.6.1	**Action:** Patient-level data matching the designated parameters required for the appropriate quality measure (including data automatically collected through the EHR, manually extracted data, and administrative data such as claims information), are retrieved and put into the specified format.	Many hospitals will aggregate data into a transferable record, and transmit to a contracted vendor for internal quality measurement and analysis. The steps that follow may also be carried out by the hospital or by such support services.
6.1.6.2	**Action:** The hospital validates that the information aggregated is accurate.	Prior to calculation of the quality measure, hospitals validate the identification of the patients for inclusion and the accuracy of the data aggregated.
6.1.7	**Event:** Calculate quality measure, validate and correct if necessary	
6.1.7.1	**Action:** Based on the pre-defined measure specifications, quality measures are calculated using the patient-level data compiled.	In order for quality measures to be calculated, inclusion and exclusion criteria as dictated by the measure specification are applied, and risk adjustment is included when necessary.

Code	Description	Comments
6.1.7.2	**Action:** An initial report with detailed, patient-level quality information and hospital-level quality measurement (including initial hospital scores per quality measure) is prepared either by the hospital or its support services. The patient-level information is validated by the hospital. Any corrections required are made and the measure is re-calculated.	The quality measure calculations are verified against the source data and specifications.
6.1.8	**Event:** Transmit patient-level quality information	
6.1.8.1	**Action:** Patient-level quality measures data are transmitted either by the hospital or by the hospital's support service to a Multi-hospital Measurement and Reporting entity consistent with all privacy restrictions and limitations and transmission security standards.	The quality measures data, which are patient-level data, are transmitted either via a HIE, if available, or by point-to-point exchange to the Multi-hospital Measurement and Reporting entity. Prior to external transmission of this information, it is typically made available for review. This initial "feedback" of quality measurement to hospitals allows for the initiation of quality improvement practices (see 6.1.10).
6.1.9	**Event:** Receive and validate preview report of quality measures; provide corrections if required	
6.1.9.1	**Action:** A preview report is received from the Multi-hospital Measurement and Reporting entity. The report is validated by the hospital for accuracy of the data.	The preview report includes patient-level quality information and hospital-level quality measurement. It is verified to ensure that the patient-level information used to calculate the quality measures is correct and matches the original information sent by the hospital. Additionally, this report serves as communication to the hospital of its "hospital-level" quality measurement, which may be reported by the Multi-hospital Measurement and Reporting entity.
6.1.9.2	**Action:** If data corrections are required, they are sent to the Multi-hospital Measurement and Reporting entity.	
6.1.10	**Event:** Identify areas for improvement	
6.1.10.1	**Action:** Hospitals review quality data and use this information to guide internal quality improvement activities.	Based on the initial report of quality measurement provided in Event 6.1.7, hospitals begin analyzing information to identify areas for improvement and systemic process changes that support overall quality improvement.
6.1.11	**Event:** Inform electronic work processes to prompt quality improvement at point of care and support efficient quality reporting	

Code	Description	Comments
6.1.11.1	**Action:** Based upon analysis of quality measurement information (both initial report and preview report), electronic work processes may be modified to provide more relevant information for the treating clinician or ancillary provider (e.g., pharmacist).	Based upon the quality measurement reports, workflow and information support may be refined to improve the quality of care through clinical decision support tools such as availability of measure parameters, standardized order sets, computerized alerts and reminders, and clinical guidelines. Such refinements may also serve to lessen the burden over time of manual extraction of patient information for purposes of quality measurement.
6.1.12	**Event:** Implement quality improvement initiatives	
6.1.12.1	**Action:** Hospitals implement quality improvement initiatives based on quality measurement; clinicians modify practice based on feedback received.	Quality measurement data are used to inform hospital and clinician quality improvement initiatives. Internal patient-level quality measurement data may be used to influence the management of particular conditions, or patient populations as well individual clinician practices.

Figure 6-4. Hospital-based Care Quality Information Collection and Reporting, Information Exchange Events and Actions Table

Code	Description	Comments
6.2.1	**Event:** Match patient-level longitudinal data	
6.2.1.1	**Action:** Patient-level information from multiple sources is matched to create a longitudinal view for a specific patient.	Information from multiple sources including EHR data from hospitals or clinician practices, and payor data from multiple payors could be logically linked to provide a longitudinal view of the patient's clinical experience for quality measurement. Quality measures that span settings do not exist today, but are expected to evolve over time. One example of such a measure is the re-admission rate for a particular condition at a particular hospital – one would need data from multiple hospitals to calculate this measure. A generalized process for matching patients is described in Appendix A2.0: Arbitrating Identities.
6.2.2	**Event:** As appropriate, pseudonimize or de-identify the patient-level data which are being readied for transmission. Pseudonimization allows for data to be re-linked if requested by an authorized entity	

Code	Description	Comments
6.2.2.1	**Action:** Pseudonimize or de-identify patient-level data.	
6.2.2.2	**Action:** A randomized data linker is provided to allow authorized entities the ability to re-link to the individual patient.	Functionality is provided to re-link data to a specific patient for authorized entities.
6.2.2.3	**Action:** Required data are checked to ensure full compliance with privacy and security requirements.	All data being transmitted are checked for proper de-identification or pseudonimization and compliance with applicable security and privacy standards.
6.2.2.4	**Action:** Relink data as authorized by authorized requesting entity	

Figure 6-5. Hospital-based Care Quality Information Collection and Reporting, Multi-hospital Measurement and Reporting Events and Actions Table

Code	Description	Comments
6.3.1	**Event:** Collect information	
6.3.1.1	**Action:** Patient-level quality data as defined by quality measure specifications are received from the Hospital or from the hospital's vendor.	Patient-level quality data may be received via HIE, if available, or by point-to-point exchange. As the availability of electronic health information grows and quality measures include measurement of episodes of care requiring longitudinal patient health information, quality data may be received by Multi-hospital Measurement and Reporting entities after having been matched to other data sources through an HIE. A generalized process for matching patients is described in Appendix A 2.0: Arbitrating Identities.
6.3.2	**Event:** Calculate quality measures for each hospital	
6.3.2.1	**Action:** Based on the pre-defined measure specifications, hospital-level quality measures are calculated using the patient-level data submitted by hospitals. A preview report is prepared for each hospital.	In order for quality measures to be calculated, inclusion and exclusion criteria as dictated by the measure specification are applied, and risk adjustment is included when necessary.
6.3.3	**Event:** Transmit preview report of hospital-level quality measurement for validation/correction	
6.3.3.1	**Action:** Preview reports of hospital-level quality measurement are sent to hospitals for data validation and if necessary, data correction, prior to reporting.	Preview reports of hospital-level quality measurement are sent to hospitals for data validation and correction if required. Corrected patient-level quality data may be re-submitted depending on the Multi-hospital Measurement and Reporting entity.
6.3.4	**Event:** Re-calculate quality measures as needed	
6.3.4.1	**Action:** Revised quality information is received from the hospitals. The reports may be re-calculated again if necessary and sent to hospitals for data validation and correction if needed.	Corrected data are received by the Multi-hospital Measurement and Reporting entity. The quality measures are re-calculated and are sent to the hospital for data validation and if needed data correction. This feedback is repeated as often as necessary within specified time periods to ensure the correct data are used to calculate hospital-level quality measurements.
6.3.5	**Event:** Perform audit for accuracy of quality measurement	

Code	Description	Comments
6.3.5.1	**Action:** The Multi-hospital Measurement and Reporting entity conducts routine audits to ensure the integrity of the data submitted, and the accuracy of the quality measurement process.	The Multi-hospital Measurement and Reporting entity selects a specified number of records with its associated patient-level information, and performs an audit, to ensure the integrity and accuracy of the measurement and reporting program.
6.3.6	**Event:** Format and distribute quality information	
6.3.6.1	**Action:** The completed hospital-level quality measurement report is distributed and made available to users for viewing and possibly downloading.	The final hospital-level quality measurement data are distributed for public access and other uses. It is made available in appropriate formats to users for viewing and possibly for downloading.

7.0 Clinician Quality Information Collection and Reporting

Figure 7-1. Clinician Quality Information Collection and Reporting Flow

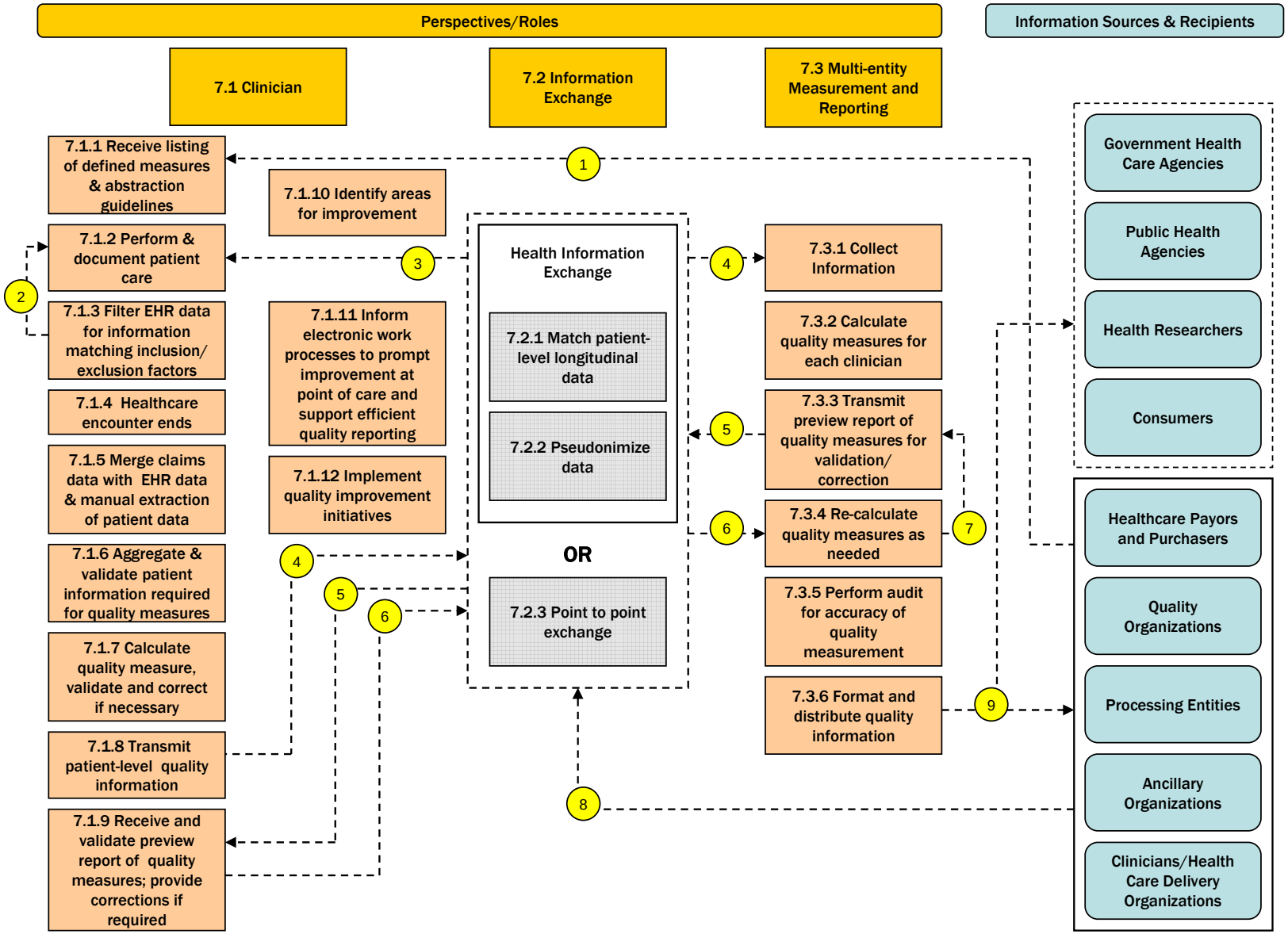


Figure 7-2. Clinician Quality Information Collection and Reporting Scenario Flows

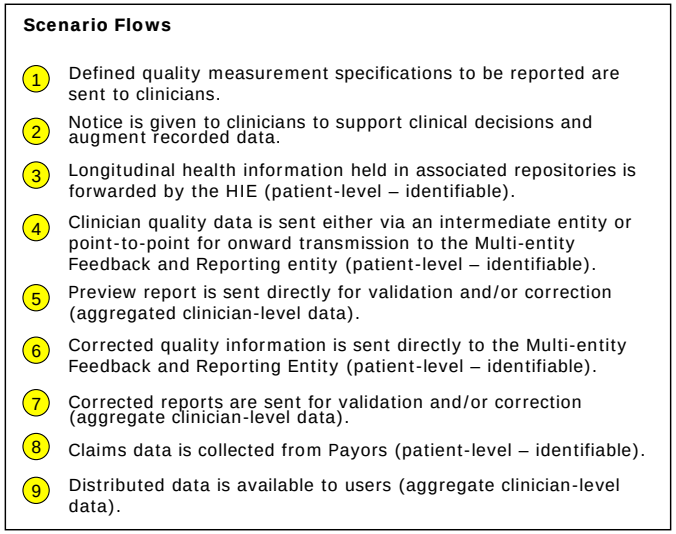


Figure 7-3. Clinician Quality Information Collection and Reporting, Clinician Events and Actions Table

Code	Description	Comments
7.1.1	**Event:** Receive listing of defined measures & abstraction guidelines	
7.1.1.1	**Action:** Clinician organizations receive the listing of quality measures and detailed measure specifications for how a quality measure will be calculated.	Detailed measure specifications that define numerator, denominator, algorithm, etc. for calculation of measure are provided, in addition to abstraction guidelines that provide standard instruction on what types of patient information should be abstracted from the patient record. A generalized process is described in Appendix A 1.0: Provisioning for Secondary Use.
7.1.1.2	**Action:** Clinician organizations identify the measures which apply to their patient population.	Clinicians determine which measures apply to their population and select the measures which they will manage and report. Standardized technical specifications for these defined quality measures are incorporated into the EHR, in order to automate data capture and reporting of quality measurement data where possible. Validation testing may be done to ensure that the data gathering process accurately meets the measure specifications and technical data specifications.

Code	Description	Comments
7.1.2	**Event:** Perform and document patient care	
7.1.2.1	**Action:** Clinical personnel treat the patient's injuries or illness, or provide wellness/preventive care. The patient is assessed and observations are documented; appropriate diagnostics and treatments are ordered and completed. Clinical information is entered into the patient's EHR.	The clinician evaluates the patient, considers a presumptive diagnosis and identifies clinical problems that may drive care and treatment. Observations are documented, and relevant diagnostics and treatment are ordered. To the extent possible, information entered into the EHR is structured, and provides the level of detail needed to satisfy the data requirements of relevant measure specifications. Depending on the level of clinical decision support available, standardized order sets, computerized alerts and reminders, and clinical guidelines may be made available to the clinician.
7.1.3	**Event:** Filter EHR data for information matching inclusion/ exclusion factors	
7.1.3.1	**Action:** Based on the defined measure specifications and potential technical specifications incorporated into the EHR workflow, patients relevant for each "denominator" (a case relevant to include for a particular quality measure) are identified using the clinical information entered. If the information is present, the patient is identified as eligible for the measure, based on inclusion criteria.	Once a patient is deemed eligible for a quality measure, they are evaluated for interventions and processes to determine defined by the quality measures. For example, if a patient presents with a history of Diabetes Mellitus, he or she is eligible for consideration in a number of quality measures applicable to care and treatment of a diabetic patient.
7.1.3.2	**Action:** Based on documentation entered by the clinician, data are filtered for exclusion criteria for each case identified as eligible for a quality measure.	For patients who are identified as eligible for a quality measure, there may be contra-indications that would exclude that patient from being included for a particular quality measure. For example, although administration of a beta-blocker is recommended in AMI patients (and for which there is a quality measure defined to determine whether recommended treatment is followed) a patient may be excluded due to presence of a contra-indication, such as a history of asthma.
7.1.4	**Event:** Healthcare encounter ends	
7.1.4.1	**Action:** The clinician concludes the healthcare encounter. Additional data may be extracted from the patient record to inform the quality measure.	The appropriate information is entered into the electronic health record by the clinical staff, closing the patient encounter. Additional information such as diagnosis, procedures, and test results may be available for quality measure determination.
7.1.5	**Event:** Merge administrative data with EHR data and manual extraction of patient data	
7.1.5.1	**Action:** Administrative data such as data used to generate claims are merged with clinical information from an EHR. Information related to a quality measure that is not automated through an EHR is manually extracted from the patient record.	Many of the current AQA measures are derived from administrative data used to generate claims. In addition to automated clinical information from EHRs, outstanding information required to complete the specification requirements for a quality measure may be manually extracted from the EHR or paper-based records by support staff. The information is entered into a report template. A generalized process for matching patients is described in Appendix A2.0: Arbitrating Identities. A generalized process for augmenting clinical information is described in Appendix A3.0: Augmenting Clinical Information.

Code	Description	Comments
7.1.6	**Event:** Aggregate and validate patient information required for quality measures	
7.1.6.1	**Action:** Clinician's personnel retrieve patient-level data matching the designated parameters required for the appropriate quality measure (including data automatically collected through claims data, the EHR, and manually extracted data), and prepare it in the specified format.	Designated support staff aggregate data into a transferable record, and use it for internal quality measurement and analysis. The steps that follow may be carried out by the clinician organization or by a contracted vendor, or may be skipped in its entirety and clinicians may transmit quality data directly to the Multi-entity Measurement and Reporting entity, or to a payor through a claim that would subsequently be transmitted to the Multi-entity Measurement and Reporting entity.
7.1.6.2	**Action:** Clinician's personnel validate that the information aggregated is accurate.	Prior to calculation of the quality measure, designated staff validate the identification of the patients for inclusion and the accuracy of the data aggregated.
7.1.7	**Event:** Calculate quality measure, validate and correct if necessary	
7.1.7.1	**Action:** Based on the pre-defined measure specifications, quality measures are calculated using the compiled patient-level data.	
7.1.7.2	**Action:** An initial report with detailed, patient-level quality information and clinician-level quality measurement (including initial clinician scores per quality measure) is prepared. The patient-level information is validated by the clinician organization.	The quality measure calculations are verified against the source data and specifications. Any corrections required are made and the measure is re-calculated.
7.1.8	**Event:** Transmit patient-level quality information	
7.1.8.1	**Action:** Patient-level data are transmitted to a Multi-entity Measurement and Reporting entity consistent with all privacy restrictions and limitations and transmission security standards.	The calculated quality measures, which are patient-level data, are transmitted either via a HIE, if available, or by point-to-point exchange to the Multi-entity Measurement and Reporting entity. In some cases, claims data may be submitted through payors, as is the case today with 30-day mortality measures which are submitted to CMS by various payors. Prior to external transmission of this information, it is typically made available for review. This initial "feedback" of quality measurement to clinicians allows for the initiation of quality improvement practices (see 7.1.10).
7.1.9	**Event:** Receive and validate preview report of quality measures; provide corrections if required	
7.1.9.1	**Action:** A preview report is received from Multi-entity Measurement and Reporting entity. The report is validated by the clinician organization for accuracy of the data.	The preview report includes patient-level quality information and clinician-level quality measurement. It is verified to ensure that the patient-level information used to calculate the quality measures is correct and matches the original information sent by the clinician. Additionally, this report serves as communication to the clinician organization of the "clinician-level" quality measurement, which may be reported for public use by the Multi-entity Measurement and Reporting entity.

Code	Description	Comments
7.1.9.2	**Action:** If data corrections are required, they are sent to the Multi-entity Measurement and Reporting entity.	
7.1.10	**Event:** Identify areas for improvement	
7.1.10.1	**Action:** Clinician organizations review quality data and use this information to guide internal quality improvement activities.	Based on the initial report of quality measurement provided in Event 7.1.6 if available, the clinician organization begins analyzing information to identify areas for improvement and systemic process changes that support overall quality improvement.
7.1.11	**Event:** Inform electronically supported clinical processes to prompt quality improvement at point of care and support efficient quality reporting	
7.1.11.1	**Action:** Based upon analysis of quality measurement information (both initial report from internal measurement activities and preview report of public reporting activities), processes may be refined to provide more relevant information for the treating clinician**.**	Based upon the quality measurement reports, processes and systems may be refined to improve integration with the clinical workflow and to improve the quality of care delivered at the point of care, through clinical decision support tools such as standardized order sets, computerized alerts and reminders, and clinical guidelines. Such refinements may also serve to lessen the burden over time of manual extraction of patient information for purposes of quality measurement.
7.1.12	**Event:** Implement quality improvement initiatives	
7.1.12.1	**Action:** Clinicians modify practice based on feedback received.	Quality measurement data are used to inform clinician quality improvement initiatives. Internal patient-level quality measurement data may be used to conduct focused reviews in management of particular conditions, or patient populations as well as reviews of individual clinician practices.

Figure 7-4. Clinician Quality Information Collection and Reporting, Information Exchange Events and Actions Table

Code	Description	Comments
7.2.1	**Event:** Match patient-level longitudinal data	
7.2.1.1	**Action:** Patient-level information from multiple sources is matched to create a longitudinal view for a specific patient.	Information from multiple sources including EHR data from hospitals or clinician practices, and payor data from multiple payors could be logically linked to provide a longitudinal view of the patient's clinical experience for quality measurement. A generalized process for matching patients is described in Appendix A2.0: Arbitrating Identities.
7.2.2	**Event:** As appropriate, pseudonimize or de-identify the patient-level data which are being readied for transmission. Pseudonimization allows for data to be re-linked if requested by an authorized entity	

Code	Description	Comments
7.2.2.1	**Action:** Pseudonimize or de-identify patient-level data.	
7.2.2.2	**Action:** A randomized data linker is provided to allow authorized entities the ability to re-link with the individual patient.	Functionality is provided to re-link data to a specific patient for authorized entities engaged in quality measurement.
7.2.2.3	**Action:** Required data are checked to ensure full compliance with privacy and security requirements.	All data being transmitted is checked for proper pseudonimization and compliance with applicable security and privacy standards.
7.2.2.4	**Action:** Relink data as authorized by authorized requesting entity	

Figure 7-5. Clinician Quality Information Collection and Reporting, Multi-entity Measurement and Reporting Events and Actions Table

Code	Description	Comments
7.3.1	**Event:** Collect information	
7.3.1.1	**Action:** Patient-level quality data as defined by measure specifications are received from the clinician or from contracted vendor.	Patient-level quality data may be received via HIE, if available, or by point-to-point exchange. As the availability of electronic health information grows over time, and as quality measures expand to include measurement of episodes of care requiring longitudinal patient health information, quality data may be received by Multi-entity Measurement and Reporting entities after having been matched to other data sources through a HIE. A generalized process for matching patients is described in Appendix A2.0: Arbitrating Identities.
7.3.2	**Event:** Calculate quality measures for each clinician	
7.2.3.1	**Action:** Based on the pre-defined measure specifications, clinician-level quality measures are calculated using the patient-level data submitted by clinicians. A preview report is prepared for each clinician.	
7.3.3	**Event:** Transmit preview report of clinician-level quality measurement for validation/correction	
7.3.3.1	**Action:** Preview reports are sent to clinicians for data validation and if necessary, data correction, prior to public reporting.	Preview reports of clinician-level quality measurement are sent to clinicians for data validation and correction if required. Corrected patient-level quality data may be re-submitted depending on the Multi-entity Measurement and Reporting entity.
7.3.4	**Event:** Re-calculate quality measures as needed	

Code	Description	Comments
7.3.4.1	**Action:** Revised quality information is received from the clinicians. The reports may be re-calculated again if necessary and sent to clinicians for data validation and correction if needed.	Corrected data are received by the Multi-entity Measurement and Reporting entity. The quality measures are re-calculated and are sent to the clinician for data validation and if needed data correction. This feedback is repeated as often as necessary within specified time periods to ensure the correct data are used to calculate clinician-level quality measurements prior to public reporting.
7.3.5	**Event:** Perform audit for accuracy of quality measurement	
7.3.5.1	**Action:** The Multi-entity Measurement and Reporting entity conducts routine audits to ensure the integrity of the data submitted, and the accuracy of the quality measurement process.	The Multi-entity Measurement and Reporting entity selects a specified number of records with its associated patient-level information, and performs an audit, to ensure the integrity and accuracy of the measurement and reporting program.
7.3.6	**Event:** Format and distribute quality information	
7.3.6.1	**Action:** The completed clinician-level quality measurement report is distributed and made available to users for viewing and possibly downloading.	The final clinician-level quality measurement data are distributed for public access and other uses. It is made available in appropriate formats to users for viewing and possibly for downloading.

8.0 Quality Dataset Considerations

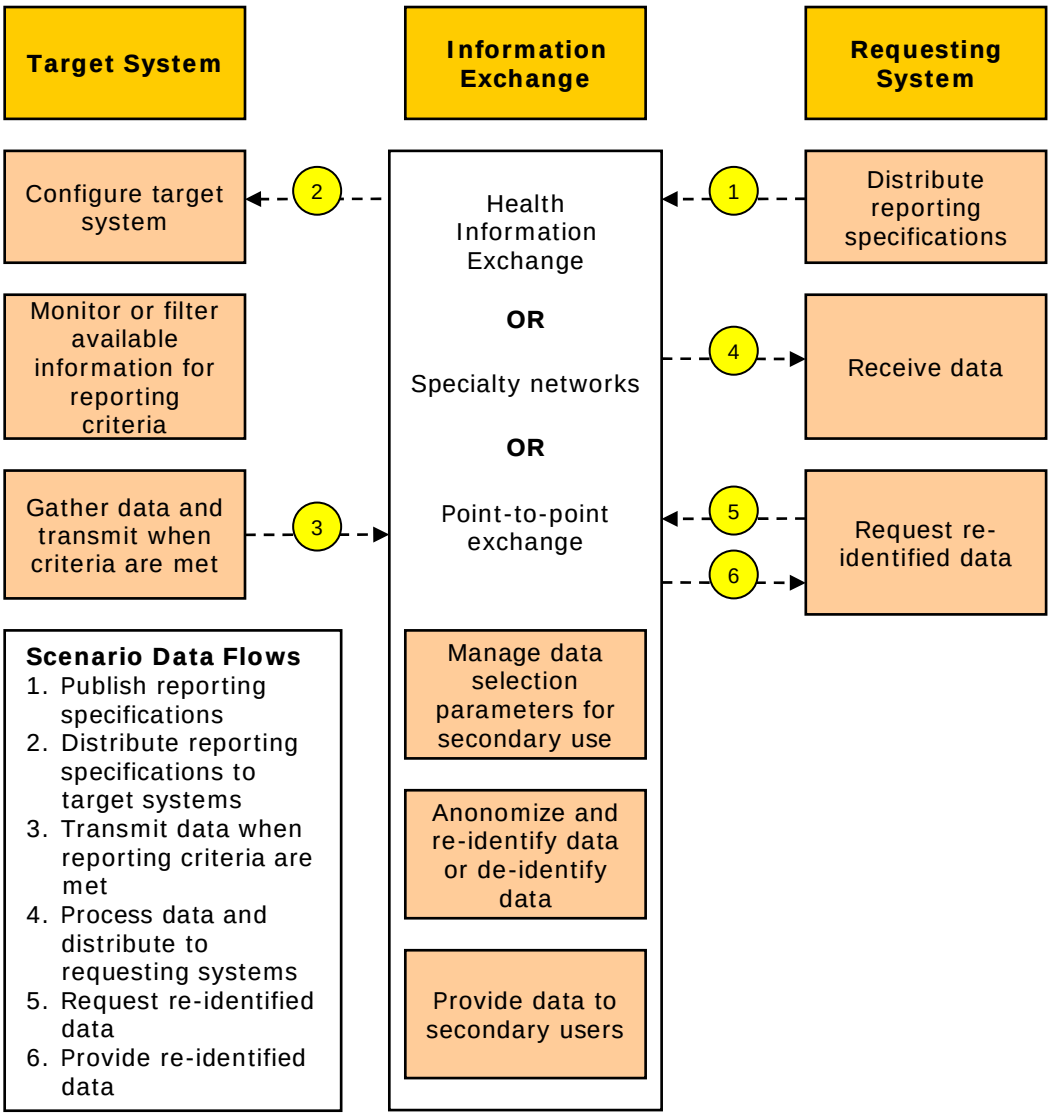
At this time 21 HQA measures and 109 AQA measures have been defined, each requiring various types of data elements. To date, there is no established "data set" of elements associated with these quality measures. In order to accelerate the automation of quality reporting through the use of EHRs, the Quality Alliance Steering Committee (QASC) is in the process of convening an expert panel to identify a set of common data elements that may be standardized for automated reporting of a prioritized subset of HQA and AQA measures. According to recommendations brought forth by the Quality Work Group and accepted by AHIC in March 2007, the QASC is expected to prioritize a set of measures and identify a set of common data elements by June 2007.

This use case is predicated on the identification of a set of common data elements by the QASC. The set of common data elements derived from the prioritization of a subset of quality measures is a starting point and does not represent a complete list.

Appendix A: Common Processes

A1.0 Provisioning for Secondary Use

Figure A1-1. Provisioning for Secondary Use



Concept - Secondary use systems could communicate reporting needs to provider systems in a form that could be used to configure those systems to gather and report needed information. The focus would be to electronically describe the data needs, terminologies, algorithms, etc. in a way which could be readily used in the target systems to report the needed information.

Generalized information flow - A target system may contain data which is of interest to users of a requesting system. The requesting system communicates the request for data in

the form of reporting specifications to the target system. The target system implements the reporting specifications and monitors for the presence of data which meet the reporting criteria. This monitoring process persists in the target system until the request is withdrawn or expires. When the reporting criteria are met, the target system gathers the requested data, formats it according to the specifications, and transmits the data to the requesting system.

While this flow describes interaction between a single target system and single requesting system, it is likely that there will be multiple target systems which need to receive the request for data, and multiple requesting systems which need to receive the data.

This information flow describes a push model for delivering data from the target system to the requesting system. However, it may also be possible for the requesting system to initiate an ad-hoc query to the target systems to retrieve data of interest.

Examples

- Public health case reporting;
- Quality measure reporting;
- Response management queries; and
- Adverse event surveillance.

Related flows which could be called by this flow

- Augment clinical information

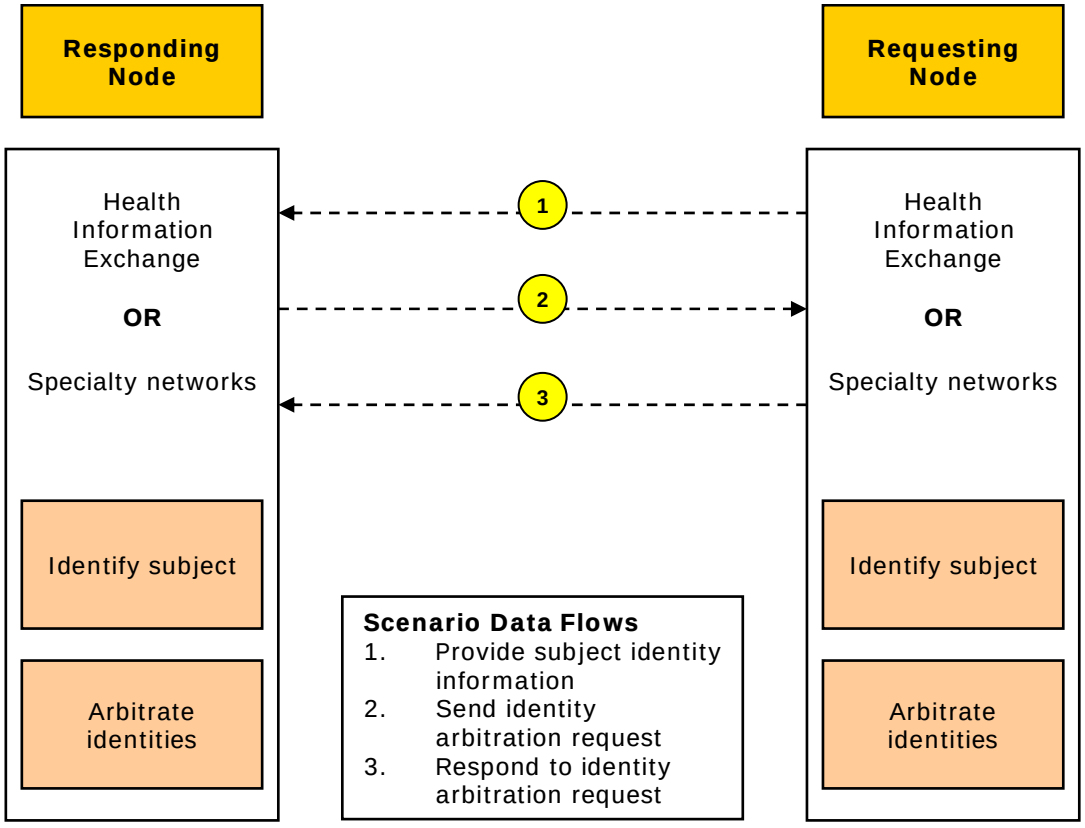
Figure A1-2. Provisioning for Secondary Use Scenario Data Flows Table

Flow	Description	Comments
1	Publish reporting specifications	Entities wishing to receive data from a target system distribute the reporting requirements and specifications in interoperable electronic form. Specifications could include: ▪ Filtering or triggering criteria describing specific data or temporal conditions which, when met, would initiate the data gathering and reporting process in the target system. Criteria could be based on the presence of specific data value(s), could be time-based, or be based on other algorithms; ▪ Data reporting specifications including data sets and specific taxonomies or vocabularies to be used by the target system when reporting. This may also include conditional data requirements, which only need to be reported when additional criteria are met by data in the target system (e.g., if a particular combination of data values are present in the target system, gather the following additional data); ▪ Specifications for data formatting, messaging, privacy and security requirements, etc.; and ▪ Routing and distribution specifications including identifying information for all systems which should receive the data.
2	Distribute reporting	Information exchange mechanisms distribute the reporting specifications to the

Flow	Description	Comments
	specifications to target systems	target systems. This could be accomplished by point-to-point exchanges, specialty networks, or health information exchanges. ▪ Point-to-point exchange – could include direct (push) transmission of the reporting specifications from the requesting system to the target system or delivery upon a request initiated by the target system (pull). ▪ Specialty networks – may exist which manage the routing of data requests and reports among specific groups of entities. These networks may also provide additional capabilities. ▪ Health information exchange – may have the capability to manage the distribution of data selection parameters on behalf of target and requesting systems. This could include determining which connected systems should receive the reporting specifications based on the target system capabilities identified in HIE registries and routing the specifications to those systems.
3	Transmit data when reporting criteria are met	Based on the reporting specifications, target systems are configured to monitor or filter available data, and initiate a report when the reporting criteria are met. When the reporting criteria are met, the target system gathers the required data and assembles it in the format required, utilizing the taxonomies and vocabularies defined in the reporting specifications. The target system transmits the data using point-to-point, specialty networks, or health information exchange capabilities.
4	Process data and distribute to requesting systems	If the data are distributed via health information exchange, capabilities may be available to: ▪ Anonymize and re-identify data or de-identify data based on the reporting specifications; and ▪ Distribute the data to multiple receiving systems based on the distribution specifications in the reporting requirements and the receiving system capabilities identified in the HIE registries.
5	Request re-identified data	The requesting system may have an authorized need to re-identify data received in flow #4. The requesting system sends a request for re-identification to the information exchange to re-identify the data.
6	Provide re-identified data	After confirming that the requesting system has been authorized to receive re-identified data, the information exchange provides the re-identified data to the requesting system.

A2.0 Arbitrating Identities

Figure A2-1. Arbitrating Identities



Concept - Systems involved in exchanging patient-specific information need mechanisms to reconcile person identity between nodes (e.g., between health information exchanges) without a universal identifier.

Generalized information flow – The requesting node has a need to determine if the responding node has information about a specific individual (a "subject", such as a provider or patient). The requesting node sends subject identifiers to the responding node. The responding node determines whether it can:

- Match the provided identifiers to a subject known to the responding node;
- Identify a match that has some conflicting information such as an old address; and
- Not match to any subject known by the responding node.

Identity arbitration represents the reconciliation of identify information between two nodes to ensure that data are correctly associated with the right subject. The responding node

identifies a match, or in some circumstances, replies with information about a match which might not exactly correspond to all the information provided by the requesting node. The requesting node evaluates the information provided for the candidate subjects and determines whether there should be a link to the subject of interest. If the requesting node determines that there should be a link, it transmits information about the link to the responding node. Processes to maintain the linkage may also be operational between nodes (e.g., if one of the nodes becomes aware of changes to the information which was used to create the match).

Identity arbitration occurs between two nodes in a network when data must be transacted between those nodes. This process does not imply that all identities are reconciled between nodes, only that they are reconciled on an as needed basis.

Examples

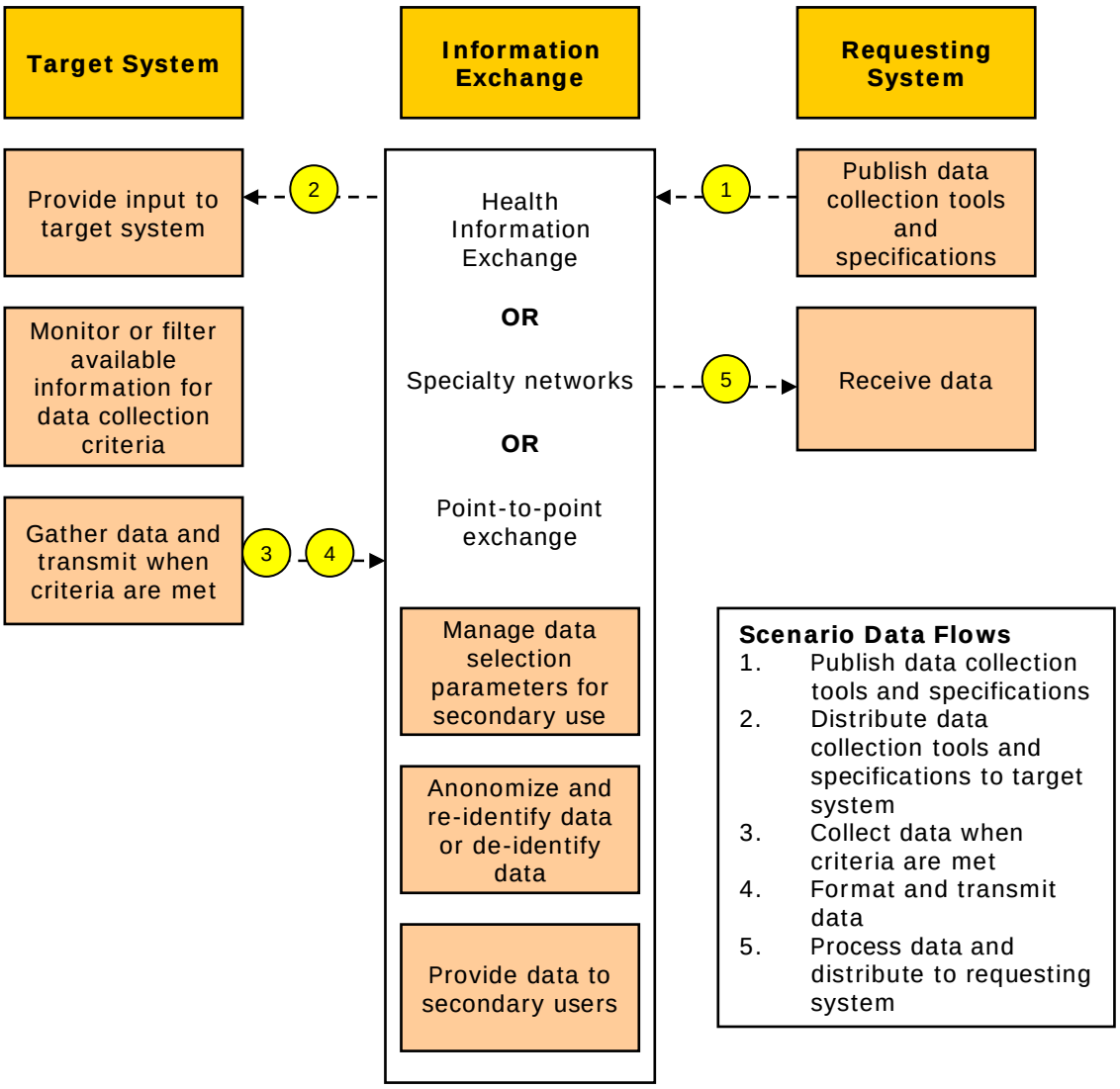
- HIE to HIE interactions;
- CDO – HIE interactions; and
- PHR – HIE interactions.

Figure A2-2. Arbitrating Identities Scenario Data Flows Table

Flow	Description	Comments
1	Provide subject identity information	The requesting system sends information describing the subject of interest to the responding node.
2	Send identity arbitration request	Using the information provided by the requesting node, the responding node carries out a process to match the subject of interest to those known to the responding node. If the responding node determines that there is a match, it replies as such. In appropriate cases, if the responding node determines that it has a match that does not completely correspond to the provided information (such as an old address), the responding node sends information on the match and any conflicts to the requesting node. If the responding node determines that it cannot match the subject of interest, it responds accordingly.
3	Respond to identity arbitration request	The requesting node assesses the match information provided by the responding node and determines whether there should be a link with the subject of interest. If the requesting node determines that there should be a link, it communicates to the responding node, which also maintains the linkage between nodes.

A3.0 Augmenting Clinical Information

Figure A3-1. Augmenting Clinical Information



Concept - Target systems may not contain all of the information needed to support secondary use reporting, so target systems may need to be configured to prompt the appropriate user to provide additional information. In some instances the mechanism to collect this additional information could be provided through the provisioning for secondary use process.

Generalized information flow - A target system may not contain all of the data which are of interest to users of a requesting system. The requesting system communicates the request for data in the form of standardized questions, question sets (forms), response vocabularies and data collection specifications to the target system. The target system instantiates the

data collection specifications and monitors for the presence of data which meet the data collection criteria. This monitoring process persists in the target system until the request is withdrawn or expires. When the data collection criteria are met, the target system prompts the appropriate user to provide the requested data, formats it according to the specifications and transmits the data to the requesting system. This same process could be used to update or modify a previously published data collection request.

While this flow describes interaction between a single target system and single requesting system, it is likely that there will be multiple target systems which need to receive the request for data, and multiple requesting systems which need to receive the data from the target systems.

This information flow describes a push model for delivering data from the target system to the requesting system. However, it may also be possible for the requesting system to initiate an ad-hoc query for augmented information to the target systems to retrieve data of interest.

Examples

- Quality measure reporting
- Public health case reporting
- Response management queries

Related flows which could call this flow

- Provisioning for Secondary Use

Figure A3-2. Augmenting Clinical Information Data Flows Table

Flow	Description	Comments
1	Publish data collection tools and specifications	Entities wishing to receive data from a target system distribute the data collection specifications in interoperable electronic form. Specifications could include: ▪ Filtering or triggering criteria describing specific data or temporal conditions which, when met, would initiate the data gathering and reporting process in the target system. Criteria could be based on the presence of specific data value(s), could be time-based, or be based on other algorithms; ▪ Data reporting tools and specifications including standardized questions, question sets (forms), and response vocabularies to be used by the target system users when reporting; ▪ This may also include conditional data requirements, which only need to be reported when additional criteria are met by data in the target system (e.g. if a particular combination of data values are present in the target system, gather the following additional data); ▪ Specifications for data formatting, messaging, privacy and security requirements, etc.; and ▪ Routing and distribution specifications including identifying information for all systems which should receive the data.
2	Distribute data collection tools and specifications to target systems	Information exchange mechanisms distribute the data collection tools and specifications to the target systems. This could be accomplished by point-to-point exchanges, specialty networks or health information exchanges. ▪ Point-to-point exchange – could include direct (push) transmission of the data collection tools and specifications from the requesting system to the target system or delivery upon a request initiated by the target system (pull). ▪ Specialty networks – may exist which manage the routing of data requests and reports among specific groups of entities. These networks may also provide additional capabilities. ▪ Health information exchange –may have the capability to manage the distribution of data collection tools and specifications on behalf of target and requesting systems. This could include determining which connected systems should receive the data collection tools and specifications based on the target system capabilities identified in HIE registries and routing the data collection tools and specifications to those systems.
3	Collect data	Based on the data collection specifications, target systems are configured to monitor or filter available data and initiate data collection activities when the reporting criteria are met. When the reporting criteria are met, the target system prompts a user to provide the requested data according to the standardized questions and response possibilities provided. The standardized question sets (forms) may implement in the target system workflow and or queued to be completed by support personnel.
4	Transmit data when reporting criteria are met	After the user has provided the data, the target system assembles it in the format required utilizing vocabularies defined in the data collection specifications and appropriate data from the target system and augmented data. At times data normalization or mapping may need to be performed in order to conform to the data reporting specifications.

Flow	Description	Comments
5	Process data and distribute to requesting systems	If the data are distributed via health information exchange, capabilities may be available to: ▪ Anonymize and re-identify data or de-identify data based on the data collection specifications; and ▪ Distribute the data to multiple receiving systems based on the distribution specifications in the reporting requirements and the receiving system capabilities identified in the HIE registries.

Appendix B: Glossary

AHIC: American Health Information Community.

Ancillary Entities: Organizations that perform auxiliary roles in delivering healthcare services. They may include diagnostic and support services such as laboratories, imaging and radiology services, and pharmacies that support the delivery of healthcare services. These services may be delivered through hospitals or through free-standing entities.

AQA: A broad-based collaborative of physicians, consumers, purchasers, health insurance plans, and others focused on: a) improving health care quality and patient safety through a collaborative process in which key stakeholders agree on a strategy for measuring performance at the physician or group level; b) collecting and aggregating data in the least burdensome way; and c) reporting meaningful information to consumers, physicians, and other stakeholders to inform choices and improve outcomes. Formerly known as the Ambulatory Quality Alliance.

Clinicians: Healthcare providers with patient care responsibilities, including physicians, advanced practice nurses, physician assistants, nurses, and other credentialed personnel involved in treating patients.

CMS: Centers for Medicare & Medicaid Services, a federal agency within the Department of Health and Human Services.

Consumers: Members of the public who may receive healthcare services. These individuals may include: caregivers, patient advocates, surrogates, family members, and other parties who may be acting for, or in support of, a patient in the activities of receiving healthcare.

Data Augmentation: Supplementing data, already available, possibly through manual entry of information into a system.

Data Providers: Systems or networks that provide laboratory data or associated patient information (e.g., maintains master patient index, radiology departments, etc.) in either a hospital or ambulatory setting.

Department of Health and Human Services (HHS): This is the federal agency responsible for human health, and has oversight over many other federal agencies such as Food and Dug Administration (FDA), the National Institutes of Health (NIH), Centers for Disease Control and Prevention (CDC), CMS, Agency for Health Research and Quality (AHRQ), Substance Abuse and Mental Health Services Administration (SAMHSA), and others.

Diagnostic Test Results: Results of any diagnostic tests ordered: blood or urine tests, X-rays, EKG, etc.

Discharge plan: A synopsis of the treatments recommended for the patient to complete upon leaving the institution, including medications, medical appointments, other therapeutic interventions, further diagnostic studies, and recommendations for follow-up.

Electronic Health Record (EHR): The electronic health record is a longitudinal electronic record of patient health information generated in one or more encounters in any care delivery setting. This information may include patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory information and radiology reports.

Episode of Care: An interval of care by a healthcare facility or provider for a specific medical problem or condition. It may be continuous or it may consist of a series of intervals marked by one or more brief separations from care, and can also identify the sequence of

care (e.g., emergency, inpatient, outpatient), thus serving as one measure of healthcare provided. An episode of care is distinct from an episode of disease or illness.

Evidence-based guidelines: Clinical practice guidelines based on evidence-based medicine, designed to inform clinical practice decisions about appropriate health care for specific clinical circumstances.

Evidence-based medicine: The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

Government Healthcare Agencies: Agencies that have programs at the local, state or federal level that are involved with the delivery and/or regulation of healthcare.

Healthcare Delivery Organizations: Organizations, such as hospitals and physician practices, that manage the delivery of care. It may also include institutional providers of healthcare such as ambulatory surgical centers and public health department immunization clinics.

Healthcare Payors: Insurers, including health plans, self-insured employer plans, and third party administrators, providing healthcare benefits to enrolled members and reimbursing provider organizations. As part of this role, they provide information on eligibility and coverage for individual consumers. Case management or disease management may also be supported.

Healthcare Purchasers: Private and governmental entities that purchase healthcare for the beneficiaries they are responsible for. They usually purchase healthcare for their beneficiaries through a healthcare payor.

Health Information Exchange (HIE): A multi-stakeholder entity that enables the movement of health-related data within state, regional, or non-jurisdictional participant groups.

Health Information Management (HIM) Personnel: Personnel who manage healthcare data and information resources, encompassing services in planning, collecting, aggregating, analyzing, and disseminating individual patient and aggregate clinical data.

Health Information Service Providers (HSP): A company or other organization that supports health information exchange activities by providing participants with operational and/or technical health exchange services.

Health Information Technology System Developers: Organizations, or parts of organizations, that provide HIT solutions such as EHR applications, data repositories, web services, etc.

Health Researchers: Organizations or individuals who use health information to conduct research.

Hospital Quality Alliance (HQA): Public-private collaboration to improve the quality of care provided by the nation's hospitals by measuring and publicly reporting on that care. HQA consists of organizations that represent consumers, hospitals, doctors, employers, accrediting organizations, and Federal agencies. The HQA effort is intended to make it easier for the consumer to make informed healthcare decisions, and to support efforts to improve quality in U.S. hospitals. The major vehicle for achieving this goal is the consumer-oriented Hospital Compare website.

Measure specification: Detailed instructions necessary to convert health care data into a quality measure.

ONC: Office of National Coordinator for Health Information Technology.

Personal Health Record (PHR): A health record that can be created, reviewed, annotated, and maintained by the patient or the care giver for a patient. The personal health record may include any aspect(s) of the health condition, medications, medical problems, allergies, vaccination history, visit history, or communications with healthcare providers.

Point to Point: A direct link or communication connection with defined end points. Clearinghouses may serve a point to point function in the exchange of information.

Population health: A population health perspective encompasses the ability to assess the health needs of a specific population; implement and evaluate interventions to improve the health of that population; and provide care for individual patients in the context of the culture, health status, and health needs of the populations of which that patient is a member.

Processing Entities: Organizations which collect, aggregate and process healthcare information for primary or secondary use. In this use case, processing entities deal with quality information. Examples include but are not limited to clearinghouses, Joint Commission-contracted Performance Measurement System vendors, and regional health information exchange organizations.

Provider: The healthcare clinicians within healthcare delivery organizations with direct patient interaction in the delivery of care, including physicians, nurses, and other clinicians. Can also refer to healthcare delivery organizations.

Public Health: Federal, state, local organizations and personnel that exist to help protect and improve the health of their respective constituents.

Quality Improvement Plan: Use of quality information and analyses/trending to help providers improve quality of care delivered and endeavor to reach quality goals.

Quality Improvement Organization (QIO): Under the direction of CMS, the Quality Improvement Organization (QIO) Program consists of a national network of 53 QIOs, responsible for each U.S. state, territory, and the District of Columbia. QIOs work with consumers and physicians, hospitals, and other caregivers to refine care delivery systems to make sure patients get the right care at the right time, particularly patients from underserved populations. The Program also safeguards the integrity of the Medicare Trust Fund by ensuring that payment is made only for medically necessary services, and investigates beneficiary complaints about quality of care.

Quality Measure: A mechanism to assign a quantity to quality of care by comparison to a criterion. Clinical performance process measure is a subtype of quality measure that is a mechanism for assessing the degree to which a provider competently and safely delivers clinical services that are appropriate for the patient in the optimal time period.

Quality Organizations: Public/private organizations active in the healthcare quality measurement enterprise. These organizations include entities which set priorities, endorse measure sets, harmonize quality measures across settings, establish guidelines for collection and reporting, and support quality improvement. Examples of various quality organizations include the National Quality Forum (NQF), Hospital Quality Alliance (HQA), AQA, The Joint Commission, Centers for Medicare and Medicaid Services (CMS), the National Committee for Quality Assurance (NCQA), Quality Improvement Organizations (QIOs) and specialty medical boards.

Registries: Organized systems for the collection, storage, retrieval, analysis, and dissemination of information on individual persons to support health needs.