

Health IT Enabled Quality Improvement

A Vision to Achieve Better Health and Health Care

Overview

The Office of the National Coordinator for Health Information Technology (ONC) coordinates nationwide efforts that support the use of certified health IT and promote the adoption of national standards and the interoperable exchange of health information. Through the recent efforts of federal programs that spur health IT adoption such as the Regional Extension Center (REC), Beacon Communities, State Health Information Exchange (State HIE) and the Electronic Health Record (EHR) Incentive programs, the nation has reached the “tipping point” for health IT adoption in the provider and hospital environments. As we move forward, leveraging health IT adoption and improving the exchange of health information through the use of health IT will be integral to supporting the essential building blocks of a quality improvement (QI) ecosystem.

The main goals of health IT adoption are to achieve improved health and health care quality, safety, and communication among all members of the care team while decreasing costs and increasing value. These goals reflect the HHS National Quality Strategy (NQS), which describes HHS’ strategy and implementation plans to achieve better care, healthy people and communities and affordable care.¹ This strategy is also reflected in the Federal Health IT Strategic Plan, currently under revision. As noted in ONC’s 2014 Interoperability vision paper entitled “Connecting Health and Care for the Nation: A Ten Year Vision to Achieve an Interoperable Health IT Infrastructure,” improvements in the quality of health and health care are the primary motivators for interoperable health IT.² For our nation to realize the potential of health IT enabled QI, a robust interoperable infrastructure is foundational.

This paper will illustrate ONC’s ten-year vision for advancing health IT capabilities in a manner that will combine, at a minimum, both clinical decision support (CDS) and clinical quality measurement (CQM)

1 <http://www.ahrq.gov/workingforquality/>

2 HHS/ ONC “Connecting Health and Care for the Nation: A 10-year vision to achieve an interoperable health IT infrastructure
<http://www.healthit.gov/sites/default/files/ONC10yearInteroperabilityConceptPaper.pdf>

to enable robust and continuous quality improvement. Achieving this vision is dependent on collaboration with a vast number of QI and health IT stakeholders.³ As such, the Nationwide Interoperability Roadmap currently being drafted by ONC with [input from a broad array of stakeholders](#) will be interdependent with this health IT enabled QI vision. We hope that you share in this QI vision and will join us in further developing the strategic interoperability roadmap to accomplish this imperative transformation.

CONTEXT

Dramatic advancements have been made in digitizing the care delivery system during the past decade including, but not limited to:

- All 50 states have some form of health information exchange services available to support coordination of care.⁴
- Half of the nation's hospitals are able to electronically search for patient information from sources beyond their organization or health system.⁵ The exchange of data outside their system has risen over 50% in recent years, with six out of ten hospitals electronically exchanging health information with outside providers.⁶
- CMS and many private payers are committed to payment models that reward quality and efficiency, incentivizing better outcomes and lower costs. Presently, a very small percentage of payments by CMS are strictly fee-for-service. Nearly all CMS payment models have a link to quality, whether through the fee for service system, an alternate payment model (such as shared savings) or global population-based payment models. In order to be successful in these new payment environments, providers must invest in delivery system re-design which includes more robust leveraging of health information technology and interoperability. Public and private payers alike must commit to this transition in order for the incentives to be large enough for providers to make these substantive system-wide changes.⁷

Stakeholders of the Quality Improvement (QI) Ecosystem

- Federal Government
- State/Local Governments
- Individuals
- Providers
- Patients
- Hospitals
- Consumers
- Public
- Researchers
- Payers
- IT developers
- Knowledge curators/vendors
- Professional organizations
- Standards developers
- Quality measure stewards
- HIEs
- Public Health

3 Health IT Quality Improvement Ecosystem Stakeholders (see sidebar above)

4 <http://www.healthit.gov/policy-researchers-implementers/state-hie-implementation-status>

5 Office of the National Coordinator for Health Information Technology. 'U.S. Hospitals' Capability to Electronically Query Patient Health Information from Outside Their Organization and System,' Health IT Quick-Stat, no. 25. April 2014

6 http://www.healthit.gov/sites/default/files/oncdatabrief17_hieamonghospitals.pdf

7 Rajkumar, R. Conway, P., & Tavenner, M. (2014) CMS-Engaging Multiple Payers in Payment Reform. Doi:10.1001/jama.2014.3703

- A health IT product testing and certification program has been established in the United States. Health information technology certified under the ONC Health IT Certification Program that is used for the purposes of the EHR Incentive Programs must enable CDS interventions and capture, calculate and electronically report CQMs according to national standards.⁸
- Over one half of office-based professionals and more than 8 out of 10 hospitals are meaningfully using⁹ electronic health records (EHRs).¹⁰
- Nearly 70% of health care professionals participating in the Medicare and/or Medicaid EHR Incentive Programs have submitted CQM information to CMS or their state Medicaid agency using technology certified under the ONC Health IT Certification Program. Specifically for Medicare, 86% of hospitals and 96% health care professionals have submitted CQM information to CMS.¹¹
- A growing industry of technical innovations such as personal health records/portals, wearable devices, remote sensing and telehealth is advancing care models and consumer engagement.

Examples of CDS Types

- Documentation templates/ forms
- Order facilitation, Parameter Guidance, Care Plans and protocols
- Event-driven Alerts and Reminders
- Reference information
- Relevant Data Summaries
- Multi-patient Monitors
- Predictive and Retrospective Analytics
- Filtered Reference Information and Knowledge Resources

Sources: HIMSS Guide "Improving Outcomes with Clinical Decision Support: An Implementer's Guide." 2nd ed. Osheroff 2012

As we continue on this journey, we note that there are opportunities for improvement that remain, including, but not limited to:

- Increased adoption of health IT by providers and facilities that have not received incentives for EHR adoption to date.
- Usability and clinician workflow improvements necessary to ensure that health IT is optimized to support safe and enhanced care quality.
- The JASON report (2014)¹² noted that lack of data interoperability across EHR systems remains a substantial barrier to health information exchange and support of QI efforts.
- Interoperability standards to support QI are evolving to be better aligned. Standards for specifying and reporting CQMs from EHRs are in use, but these standards are complex, evolving, difficult to implement and often require extensive implementation guidance for each measure. As such, quality measure specifications are implemented inconsistently at the local level and are not comparable across providers and settings of care.

8 For EHRs certified to the 2014 Edition EHR certification criteria

9 As defined in the requirements for the Medicare and Medicaid EHR Incentive Programs

10 http://www.healthit.gov/facas/sites/faca/files/HITPC_Data_Analytics_Update_2014-04-08.pdf

11 Medicaid data from 2011-2013. Numbers are approximates as data self-reported from states.

12 JASON, "A Robust Health Data Infrastructure" http://www.healthit.gov/sites/default/files/ptp13-700hhs_white.pdf

- The shift to value-based payment and accountable care is creating a need for new longitudinal measures of quality and health outcomes across settings of care; this will require new health IT solutions beyond EHRs and intermediaries that will aggregate data, report measures and provide actionable feedback to providers in a rapid cycle fashion.
- The PCAST big data report from 2014¹³ recommended increased access to health data and analytics, alignment of payment with desired outcomes and sharing lessons learned from successful improvement efforts.
- The PCAST report from 2010¹⁴ highlighted the need for ONC to enable exchange of “metadata-tagged” data elements, a feature of common data elements (CDE), and that CMS should focus on these higher levels of data exchange, as well as increased use of CDS in their quality measurement programs.
- As health IT innovations occur, policy, measurement development, testing, implementation and updates reflective of the most recent evidence-based clinical guidance must all keep pace.
- Health equity and disparities in access to high quality and affordable care exist for many. Health IT is a tool to help close these gaps.

13 PCAST, “Big Data and Privacy: A Technological Perspective” http://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_big_data_and_privacy_-_may_2014.pdf

14 PCAST, “Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward” <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-health-it-report.pdf>

Clinical Quality Measures (CQM)

Tools that help 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.*

Electronic CQM (eCQM)

CQMs that are specified in a standard electronic format and are designed to use data from Health IT systems for measurement.

Clinical Decision Support (CDS)

A key functionality of health IT and certified EHRs that provides health care providers and patients with general and person-specific information, intelligently filtered and organized, at appropriate times, to enhance health and health care.

Common Data Element (CDE)

Clinical concepts that contain standardized and structured metadata, have unambiguous intent, and a clearly delineated value domain. These CDEs, such as “systolic blood pressure,” would define a curated, universal specification for each clinical or administrative concept, optimizing the data to be reused across the QI ecosystem.

* <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/index.html>

Vision for the Future

ONC envisions an electronically enabled QI ecosystem that promotes better health and care, improved communication and transparency, rapid translation of knowledge for all stakeholders and reduction in the burden of data collection and reporting for providers.¹⁵ Health IT will provide the necessary tools to achieve this vision through an interoperable infrastructure and supportive building blocks such as:

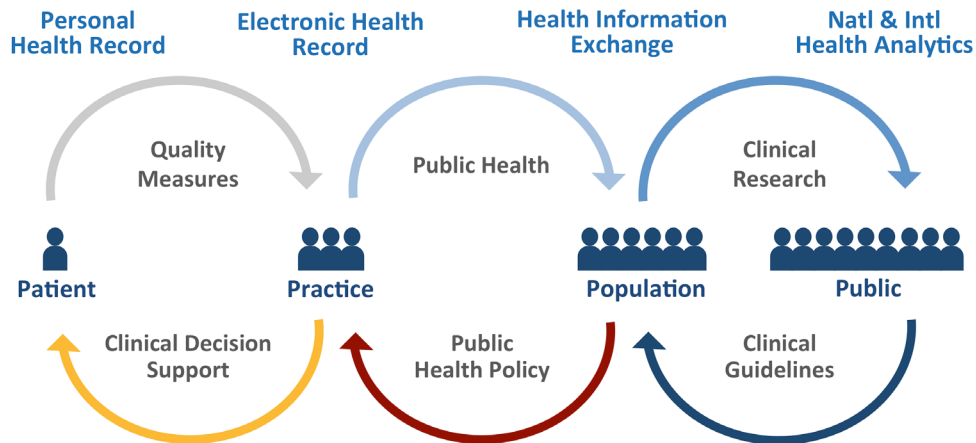
- Rapid translation of research, evidence, or best practices into electronically actionable guidelines that enable decision support, quality measurement and reporting;
- Capturing data once and reusing the data many times;
- Standardization of CDEs for the capturing or generation of health and clinical information, will enabling the improved use of data within the normal flow of care—which allows for information relevant to eQMs, CDS and federal reporting to occur more seamlessly, reducing data reentry;
- Timely, relevant, precise, valid and interoperable decision support for providers, patients, and consumers;
- Valid, reliable and accurate patient outcome measures that support risk-adjustment analysis and are comparable across settings and payers;
- Robust and real-time analytical tools for routine, practice level and ad-hoc measurement.
- Interoperable and easy to use tools that leverage/collect the existing data for multiple QI reporting programs;
- Regional aggregators of claims and clinical data that will enable quality measurement, reporting to public and private payers as well as providing comprehensive and actionable feedback to providers;
- Individual patient’s data are securely available to them and to the providers they choose whenever, and wherever, they need them (i.e., “the data follows the individual”).

Development and implementation of these QI ecosystem building blocks will create a rapid and actionable feedback loop to continually update science and refine the specificity and usability of the knowledge while making health care safer, more effective and more affordable. Data created during the normal course of care can, when collected in standard formats (e.g., CDEs), be transformed real-time into knowledge to inform clinical decisions, report on notifiable conditions or events, measure quality of care and provide evidence for patient-centered outcomes research.

This rapid and actionable feedback allows the provider, care team and patient/individual to fulfill their role in the QI ecosystem interfacing with both decision support and quality measurement to impact individual, population and public health. Transformation of the care delivery system is enabled by this ecosystem (Figure 1).

¹⁵ See stakeholder sidebar on page 2

Figure 1. Vision of the Health IT Ecosystem



Capturing health and care data in a structured way is a critical building block in the foundation of our vision of accurate, reliable, clinically meaningful measurement across systems and settings of care. Using data elements consistently and reliably will allow for information to be collected once and reused for multiple purposes, including outcomes measurement, practice level improvements, surveillance, population health, research and decision support. Through real-time CDS interventions, providers or individuals can get the right information at the right time to improve decision making, leading to better quality and outcomes of health and health care.

Evolving standards and tools exist to represent data elements, quality measures and CDS for routine use in health IT. ONC is focused on maturing these data standards and expanding them to include additional domains—including clinical guidelines, care plans and care management. Evidence-based clinical guidelines, which inform CDS and clinical quality measures (CQM), have been a few of the most valuable pieces of recent quality improvement efforts. Optimally, ONC’s vision includes leveraging these building blocks to have an even more robust and safe health IT QI ecosystem that supports the Institute of Medicine’s (IOM) vision of a learning health care system.¹⁶

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.”*

¹⁶ IOM (Instititue of Medicine) 2013. Best care at lower costs: The path to continuously learning health care in America. Washington, DC: The National Academies of Press.

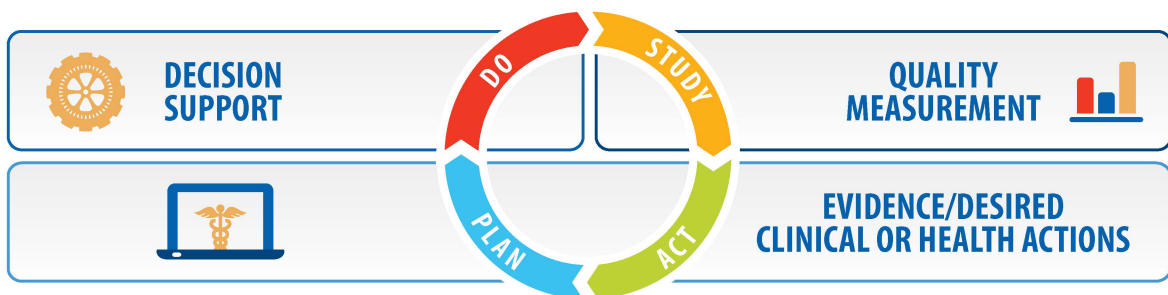
* IOM (Instititue of Medicine) 2013. Best care at lower costs: The path to continuously learning health care in America. Washington, DC: The National Academies of Press.

Figure 2: Health IT enabled Quality Improvement Ecosystem



This advanced and interoperable health IT quality ecosystem will make the right information available to the right people at the right times, across products and organizations, to help individuals make fully informed decisions about their health and healthcare and to help health care providers deliver safe, effective care. Providers, patients and researchers will have the complete health and clinical picture and benefit from personalized options informed by rich and malleable data that can provide numerous types of health IT enabled decision-making, quality monitoring and real-time and predictive analytics (see figure 2 above).

These efforts are not yet incorporated as essential pieces of a coordinated and interoperable QI ecosystem. Thus, at a minimum, we encourage all QI ecosystem stakeholders to think of health IT QI as a set of essential, interconnected and continually evolving building blocks:



Guiding Principles

As the nation continues its work toward this vision of universally high quality health and health care leveraging a health IT enabled QI ecosystem, ONC will be guided by a set of core principles:

- **Interoperability is essential.** The ability to seamlessly share and reliably use information across settings, sources and systems is essential to achieving electronically enabled quality improvement and will be critical for new payment models and environments.
- **Protect privacy and security.** It is essential to protect all individuals' health information and maintain public trust. As health and health care data become more interoperable and multi-purposed for quality improvement activities, we will strive to ensure that appropriate, strong and effective privacy and security safeguards are in place. We will also support greater transparency and responsibility for individuals regarding the business practices of entities that use their data, particularly those that are not covered by Clinical Laboratory Improvement Amendments (CLIA) and the HIPAA Privacy and Security Rules.
- **Support of the National Quality Strategy.** Health IT is a tool—a means to the end goal of improved care and better health. The National Quality Strategy (NQS) outlines aims and priorities for health and healthcare in the US. Therefore, the health IT enabled quality improvement vision will support the goals prioritized for the health of our nation including the reduction in disparities in care.
- **Build on the existing health IT infrastructure.** Significant investments in health IT have led to widespread adoption of certified health IT. To the extent possible, we will promote building on the existing health IT infrastructure and achievements, while addressing gaps and/or refining standards necessary for capturing, sharing and using health and health care data for QI activities such as quality measurement, decision support, advanced analytics, population and public health and new payment models.
- **Empower all members of the quality ecosystem.** Collecting, sharing and using data for QI activities will provide the right information to the right individuals when they need it. Individuals, patients, providers, researchers, payers and policy makers will benefit from this data accessibility and transparency, using new analytical tools and decision support resources to inform decision making to better manage health and health care.
- **Capture once and reuse.** By encouraging the development of user-centered health IT systems, providers will naturally capture all necessary data in structured format during the normal course of providing care. These data can be used to not only track individual patients' progress and needs, but also be extracted, collected and examined to drive decision support, quality measurement and reporting, population health management, public health and outcomes research. These efficiencies will also decrease costs for stakeholders.



- **Support all levels of health IT sophistication.** Different clinical contexts may need different QI support functionality. Even providers who need the same functionality, such as CDS for clinical conditions typically managed in primary-care settings, may find different ways of getting it to work best for them. For example, one provider may prefer to run CDS software on their local computer, within or alongside their EHR software, while another may prefer to use a cloud-based CDS service connected to their EHR through a secure interface. The same data standards, quality measures and CDS specifications should work smoothly across the wide variety of clinical and technical settings.
- **Foster flexibility through modularity.** Complex systems are more resilient to change and promote choice when they are divided into independent components that can be connected together. Because wellness, care delivery, and technologies will change over time, we must preserve the quality ecosystem's ability to evolve and take advantage of the best of technology and health care delivery research advancements. Modularity creates flexibility that allows innovation and adoption of new, more efficient approaches over time without overhauling the entire system. Yet, we must be conscientious that this modularity does not create additional complexities.
- **Align and Simplify.** There are many government and private data collection and reporting requirements for clinical quality improvement programs. Continued efforts to streamline and simplify these — reducing the collection and reporting burden while leveraging data reuse capabilities of health IT — is a top priority. Building on our principle of modularity, specific focus on standardizing the capture and sharing of common data elements that meet many quality improvement information needs is essential to ensure adoption in the market.
- **Focus on Value.** Health IT enabled QI efforts will be focused on ensuring valid, accurate, and comparable measurement of quality outcomes and total cost of care, as this critical information is more frequently being used for consumer, care delivery and payer decisions.

Three-Year Vision: Alignment and Standardization to Support Data Capture Within the QI Ecosystem

In conjunction with our stakeholders, we will continue to support the alignment of quality reporting programs to reduce the collection and reporting burden on providers and hospitals. The NQS prioritizes alignment of measurement policy, programs and technical implementations. ONC is focused on supporting this coordinated, technical measurement infrastructure. Through maturing standards, giving technical assistance, certifying health IT and coordination among federal and state agencies, ONC will work to harmonize and align measure components, tools and standards.

Providers, payers and health systems need highly reliable, comparable, and universally accepted performance indicators for priority health conditions and patient safety initiatives, such as preventable hospital readmissions and reduction of healthcare associated conditions. Additionally, all stakeholders may have unique QI objectives on which they would like to focus. A key building block to enabling this wide variety of QI goals is the capture of highly structured, shareable data that has the appropriate level of metadata in place to support multiple uses: CDS, advanced analytics, and quality measurement. The QI ecosystem needs CDEs and an essential set of high value universal measures to enable measurement across settings and time—leveraging clinical, claims and patient generated health and health care data in order to identify high-quality and high-value care. Over the next several years, the QI ecosystem also will require a middle layer of data aggregators that can map and normalize data from different providers' HIT applications particularly for quality measures that require data from multiple providers or applications.

Using the Standards and Interoperability (S&I) Framework, Clinical Quality Framework (CQF) Initiative ONC and CMS, in partnership with Health Level 7 (HL7), will harmonize and contribute to the development of standards for expressing and sharing CDS interventions and CQMs, ensuring these two sides of the QI coin are tightly coupled. ONC will work with its federal partners to develop interoperable CDS interventions and companion CQMs using these new interoperable QI standards and make these resources available to the public. Additionally, ONC will work with guideline developers to transform the knowledge into computable and executable formats, which will facilitate the development of QI tools that can and should be provided as a companion to the evidence based clinical knowledge.

Through the S&I Framework, in partnership with HL7 and Integrating the Healthcare Enterprise (IHE), and the Patient Centered Outcomes Research (PCOR) efforts, ONC will define a structure for CDEs and define a core set of QI CDEs for use in certified health IT products. These CDS

interventions and CQMs, along with supporting CDEs, will be maintained in an established repository such as the [United States Health Information Knowledgebase \(USHIK\)](#). With these new QI resources available, ONC will work with its public and private sector partners to develop a formal governance process to vet, maintain and refine these artifacts.

Health IT Enabled QI Vision

Impact*	3 Year: Capture Data
Patient	Patient is in need of diagnostic imaging, for example – mammogram. Insurer’s requirement for preapproval was easily obtained via the structured data in the EHR and interoperability with the insurer’s preapproval data requirements. Order for test entered (CPOE) and patient’s radiation exposure dose is documented in the EHR according to a universally agreed upon standard for the data element (CDE). Patient discusses pros/cons of the diagnostic imaging options with the provider, both benefiting from the CDS offered.
Practice	CDEs and clinical assessment data captured in the normal workflow of care delivery prompt the provider to conduct the relevant standardized mental health and substance abuse screens. Positive findings easily prompt within the care workflow identification of needs and referral for specialty treatment.
Population	Immunization data is captured, stored and shared in a standard and interoperable manner. Patient level data for preventative reminders, targeted outreach, public health response available in local EHRs/ HIEs and easily queried. Complete immunization history available on demand for patient, provider and caregiver for view, download, transmit.
Public/ Research	Medical devices, including mobile medical devices, carry and communicate a standardized unique device identifier (UDI). Health IT products and applications routinely capture these UDIs.

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Six-Year Vision: Big Data for the QI Ecosystem

Over the next six years, the standards and technology building blocks will enable quality improvement data sharing and, thus, “big data.” Quality and safety metrics will refocus from provider-centric to patient-centric. The data in health IT, including patient-generated and claims data, will be standardized, linked at the individual level to clinical data as appropriate, and optimized for interoperable sharing and aggregation. Clinical data from health IT will be increasingly structured, but will still require mapping and normalization to be aggregated and analyzed. Big data has the characteristics of high-volume, high-velocity and high-variety¹⁷ and will require effective and innovative analytic tools to filter out the “noise” and yield useful information. For the purposes of performance measurement and improvement for value based payment, regional linking of claims and clinical data will enable measurement and reporting on quality and efficiency to all payers while providing timely feedback to providers on all their patients.

The HHS open-data initiative will continue to make more readily available rich federal data sources for new knowledge discovery and innovation.¹⁸ The federal government will leverage its rich sources of shared data to provide new insights into determinates of health. This future will include the release of valid, comparable, provider-level data about quality, safety and cost to increase transparency and enable patients/individuals to make more informed decisions. New capabilities will emerge and slowly change how we carry out research, allowing researchers unprecedented access to robust data sources for stronger hypothesis generation and testing.

For example, structured CDEs captured in the course of clinical care and individuals’ self-care (with appropriate consents and privacy protections assured) will be routinely shared within the QI ecosystem. This will fuel multi-directional feedback loops that accelerate discovery and refinement of evidence-based clinical best practice. It will also facilitate the rapid adoption and consistent implementation of those best practices by providers at the point of care. Providers will have valid and real time data on patient and population status, prognosis, response, and potential risks. They will have specific and tailored decision support at the point of information consumption and decision-making.

These rich sources of standard and interoperable data will permit evaluation and modeling of different interventions and strategies, allowing the whole care team to benefit from a new decision paradigm. To guard against “information overload” and its impact on health IT usability, this point-of-care data will need to be intelligently filtered to meet the individual provider needs and allow for

17 Gartner. <http://www.gartner.com/it-glossary/big-data/>

18 <http://www.hhs.gov/digitalstrategy/digitalstrategy/open-data/index.html>

efficient thought and workflow. Big data, combined with advanced predictive analytical tools, will allow for personalized (including genomic) predictions about prognosis and response to treatment, and the complex factors influencing health, detection of drug and device safety issues, comparison of treatment options and identification of patients at high risk for adverse complications.¹⁹

The nation's health IT infrastructure will enable improvements in safety and care quality and help reduce disparities. This will be done by facilitating individual health management, better information sharing with the care team and public health and by making big data available for research to generate new evidence, which can then be expressed as standard QI interventions for delivery to and use at the point of care. Alignment of reporting requirements will greatly reduce the burden on providers as a common set of QI data that certified health IT captures and exchanges meets multiple purposes. Unified claims, clinical and patient generated health data will provide a more robust picture and will be foundational for the predominant reimbursement models based on value and quality. Certified health IT products will incorporate user-centered and safety enhanced design to optimize workflow and reduce potential clinical and technological safety events. Consumers will be able to easily locate transparent quality and safety information help guide their health, care and coverage decisions.

19 "Big Data" (Krumholz, H. (2014) Big Data and New Knowledge in Medicine: The Thinking, Training, and Tools Needed. *Health Affairs*, 22, no.7 (2014):1163-1170 doi: 10.1377/hlthaff.2014.0053

Health IT Enabled QI Vision

Impact*

6 Year: "Big" Data

Patient

Patient is in need of diagnostic imaging. Patient is concerned about previous radiation exposure. Patient and provider can easily query existing, interoperable data sources to determine the patient's past history and cumulative radiation exposure. They access an external QI resource that allows for determination of most appropriate diagnostic imaging test, standardized comparison of test facilities for access, scheduling, greatest specificity, least risk, cost sharing obligations and convenience. Order for test placed in EHR and sent to diagnostic facility.

Practice

Patient being followed for mental health needs is prompted to complete a periodic mental health self-assessment via his preferred method of electronic interaction with his mental health provider. Results for this self-assessment risk appraisal indicate a change from baseline. This change instructs the patient to follow-up with their provider and offers appointment options within 48hrs. Designated health professional alerted and contacts patient via phone. Patient's self-identified mental health emergency contacts notified to reach out to patient as previously determined by patient's preferences.

Population

Individual's complete immunization histories are electronically available to patients, providers, and immunization registries. Clinical and consumer decision support systems facilitate proactive suggestions for immunization needs tailored to individual preferences. De-identified immunization data available for school/community planners, public health, and researchers. Collection of patient experience and/or vaccine adverse events facilitated by patient generated health data.

Public/ Research

The public and researchers can access and have tools to manipulate device and associated data contained in registries or other easy to access combined data sources. These rich sources of device cost, outcomes, safety, individual user reports and de-identified patient generated health data inform stakeholder decision making and enable real time post market awareness/ surveillance.

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10-Year Vision: Fast Data, Fast Improvement Across the QI Ecosystem

By 2024, the nationwide use of interoperable health IT will be pervasive. Patients and their care team will use quality and safety data and measurement as an expected aspect of care delivery. There will be numerous advancements in the features, functionality and interoperability of health IT tools that the QI ecosystem stakeholders seamlessly interact with on a daily basis for multiple purposes such as: healthy habits of daily living, delivery of care, care coordination, population management and value based reimbursement. Our citizens will enjoy better health, high-value and high-quality care, with improved safety and highly useable technologies and resources. Individuals will view themselves as the hub of their health and care and will be considered an integral member of the care team. Technology will continue to advance and become more pervasive in every aspect of daily living. Individuals will routinely use advanced technology to manage and monitor their wellness and health care, and generate data for use by multiple IT systems and analytical tools. Their data will be available whenever and wherever they are needed to enable optimal health and care. They will enjoy personalized information and individualized care which is crucial to facilitate their wellness goals and the flow of their health information.

The practice of health care will transform into preventive, predictive and precise models. Payers, researchers and policy makers will have a better understanding of health and care outcomes and the complexity of factors influencing wellness and health care-for the individual, system and society. Care will be highly personalized and there will be real-time data feeds, communication and information exchange among the whole care team (including the patient), payers and public health departments and across all community social services human services settings. Rapid cycle data-driven improvement will become pervasive where translation from research or discovery to practice and implementation will be nearly instantaneous. Data accessibility will enable knowledge sharing, shortening the QI life cycle and ending the knowledge latency that has been so globally pervasive. Providers and stakeholders will rely upon interactive dashboards with “live” data measuring performance on standard indicators and ad hoc focus across settings of care and geographic locations will be considered standard practice. The learning health system will be in full operation, while rapid advancements in research, leveraging widespread data, will lead to powerful conclusions and almost immediate translation to health, health care practice, populations and the community.

Health IT Enabled QI Vision

Impact*	10 Year: "Fast" Data
Patient	<p>Patient is in need of diagnostic imaging. Patient and provider leverage the readily accessible QI resources to discuss options based upon current symptoms, past history, past test results and genomic profile. Health IT system's decision support rich CPOE interface guides decision making by presenting the patient's cumulative lifetime radiation dose, facilities covered under insurance with proximity to patients home/work/route; actual cost to patient; availability of appointments; and standard quality measure results. Order placed. Appointment generated and reminder sent to patient's PHR and other preferred calendar management tools.</p>
Practice	<p>Individuals with mental health needs have an integrated care team, trusted personal friends/family and community supports in place and electronically connected per patient preference. Patient generated data regarding mental health symptoms prompts interactive monitoring and messaging (coaching) alerts and delivery of scalable interventions. Pharmacologic therapy based on genomic data. Predictive analytics to identify patients at risk that need intervention and/or more intensive coordination of resources.</p>
Population	<p>Outbreak of measles in a community of children previously vaccinated emerges. Public health professionals are quickly able to determine the vaccine lot numbers of previously vaccinated children and determine a significant correlation. Immunization registries easily identify all individuals previously vaccinated with the suspect vaccine lot number and identify at risk community members and intervene preventatively.</p>
Public/ Research	<p>All member's associated with medical devices have continual feedback loop (per permissions) that improve device performance, safety recalls and improved health and care outcomes via this real-time biofeedback loop. Patient preference and genomic data are elements of the device selection, safety and performance monitoring.</p>

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How Will We Get There?

ONC will continue to collaborate with its federal partners, state and local governments, the private sector and other stakeholders to address the quality improvement ecosystem needs within the five interdependent building blocks for a nationwide interoperability health information infrastructure:

1. Technical Standards and Services
2. Certification of Health IT to Accelerate Interoperability
3. Privacy and Security Protections
4. Supportive Business, Clinical and Regulatory Environments
5. Rules of Engagement and Governance

The 10-year interoperability vision affirms that the nation will achieve a robust, health IT enabled QI ecosystem and a learning health care system. The following building blocks focus on the health IT enabled quality improvement ecosystem.

TECHNICAL STANDARDS AND SERVICES

With ONC's federal partners and through the Standards and Interoperability (S&I) Framework initiatives ONC will continue to work with QI ecosystem stakeholders to refine, expand or develop the necessary enabling technical building blocks. In the very near term, ONC will focus on linking advances in high-priority improvement tools such as CDS and clinical data registries (CDRs) to a comprehensive strategy for ensuring that data collected and reported using certified health IT products are reliable. This will include testing for and mitigation of reliability issues arising from variance in certified health IT systems tested to different CQM specifications. The current process of using increasingly complex and difficult to implement measures will be improved by facilitating the harmonization of the QI ecosystem standards being facilitated within the S & I Clinical Quality Framework initiative. The burden to code and implement CDS and eCQMs will be lessened by this effort. Additionally, ONC will actively support:

- Alignment of QI reporting requirements, including: data elements, value sets, structure and format for submission to payers that satisfies multiple payment and QI program needs and reducing the collection and reporting burden on all providers;
- Standards for modeling shared information, expressing and exchanging CDS and CQM artifacts;
- Consensus-based development of a standardized format to capture and share common data elements (CDEs) to be used for multiple information needs including QI;
- Robust predictive analytics integrated in clinical and/or consumer decision support systems;
- Development of APIs to facilitate interoperable exchange of CDEs and QI documents / tools;
- A transition from capture, calculate and report to certifying the capture, use and sharing of CDEs for QI;
- Further development of the infrastructure to support easily locating desired data, then sharing and turning that data into timely and usable information at the point of decision-making or upon request.

CERTIFICATION OF HEALTH IT TO ACCELERATE INTEROPERABILITY AND QUALITY IMPROVEMENT

ONC will continue to ensure that the ONC Health IT Certification Program rigorously supports standards-based interoperability, the QI vision, and the safe use of health IT. The ONC Health IT Certification Program will also be positioned to support the certification of an identified set of universally accepted and beneficial quality measures with associated CDS interventions for high priority health conditions. Additionally, as measures are streamlined and leverage CDEs, we will support and encourage the certification of the capture and exchange of CDEs that can be used for multiple QI efforts.

PRIVACY AND SECURITY PROTECTIONS

Structured data and interoperability facilitates the creation of big data, which provides the potential for substantial benefits to individuals and society, but also poses potential privacy and security harms.²⁰ Patient-generated data will also continue to grow exponentially and be of equal value and potential risk. ONC will strive to ensure that privacy and security related policies, practices, and technology stay in front of the risks while not stifling data sharing and innovation. We will work closely with privacy and security experts in the federal and private sectors to ensure we address risks and prevent harm while ensuring our policies enable the necessary and desired level of data sharing for providing and improving the quality of care.

SUPPORTIVE BUSINESS, CLINICAL, AND REGULATORY ENVIRONMENTS

Through recent interoperability and health IT adoption and infrastructure efforts ONC has worked with the public to develop the capacity to transform our health system into a health IT enabled quality improvement ecosystem. ONC will continue to engage, support and participate in these efforts, such as the RECs, HIEs and with CMS programs enabling delivery system reform. ONC is an active member of the NQS efforts, including the HHS Measurement Policy Council and National Quality Forum (NQF)-convened Measure Application Partnership. ONC is committed to working with our partners to coordinate and align measures, reduce reporting burden, retire unnecessary or redundant measures and adopt new CDEs to facilitate quality improvement. This effort is especially crucial for minimizing burden for providers delivering care under value-based payment arrangements. ONC will support the use of technology to help reduce disparities in care, improve quality outcomes, reduce costs and system waste, and support reimbursement based on care quality and value. To achieve this, the health IT ecosystem will need improved analytic capacity to investigate quality and cost drivers to inform access and payment policies.

²⁰ PCAST 2014 Report to the President Big Data and Privacy: A technological Perspective.

RULES OF ENGAGEMENT AND GOVERNANCE

A governance structure for the development, vetting and maintenance of the health IT QI building blocks, both clinical content and technology standards are essential to the success of this vision. This governance structure will need to ensure human and machine-readable evidence-based clinical guidelines, CQMs, QI CDEs and CDS interventions meet multiple stakeholder needs, are available for use and are clinically appropriate and technologically sound.

Participants in this QI ecosystem will need to appropriately share data once tightly held, requiring that stakeholder business and policy needs will have to be negotiated and balanced. Individuals will need a forum for this engagement, education and decision-making about the risks and benefits of sharing data.

Looking Forward

In 2014, ONC will continue development of the Nationwide Interoperability Roadmap, which will enable the health IT QI ecosystem. ONC will work with its federal partners to ensure our health IT QI efforts help all stakeholders fulfill the NQS and CMS quality strategy.²¹ Achieving the national priorities for better and more affordable health care leading to better population health, will only be possible with a strong, flexible health IT QI ecosystem that can appropriately support precise and timely decision-making, robust analytics, accurate and comparable measurement, transparency, high value care, reduced waste and protection from avoidable harm.

²¹ CMS Quality Strategy 2013 <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityInitiativesGenInfo/Downloads/CMS-Quality-Strategy.pdf>