A Measurement Framework to Assess Nationwide Progress Related to Interoperable Health Information Exchange to Support the National Quality Strategy

FINAL REPORT

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NATIONAL QUALITY FORUM

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EXECUTIVE SUMMARY

The definition of interoperability is the ability of a system to exchange electronic health information with and use electronic health information from other systems without special effort on the part of the user.[1] This definition is consistent with the definition used by the Office of the National Coordinator for Health Information Technology (ONC) in the Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap. This interoperability framework aspires over time to meet the definition of interoperability described in the 21st Century Cures Act, which means health information technology that (1) enables secure exchange and use of electronic health information without special effort by the user; (2) allows for complete access, exchange, and use of all electronically accessible health information for authorized use; and (3) does not constitute information blocking.[2] This framework does not address information blocking, but work has been done to characterize this issue.[3]

ONC recommended national standards as part of its initiative to certify electronic health record (EHR) technology, which facilitated the use of nationwide vocabulary and messaging standards for interoperability, both in the exchange of information and in its use. This provided a foundation on which disparate systems could use the appropriate formats and mechanisms to exchange data to assist providers, patients, and other stakeholders. However, true interoperability is a significant challenge to healthcare organizations for various reasons, including the lack of a common, standard framework that reconciles the differences in data as well as the varying data types. Additionally, healthcare organizations maintain incompatible products and systems, which are unable to exchange the appropriate data within the organization and with partners in its community.

As the nation continues to strive towards increased interoperability, a measurement framework would be useful not only for assessing impact, but also the extent to which progress is being made. At the request of the Department of Health and Human Services (HHS), the National Quality Forum (NQF) has taken on a project to develop a measurement framework and measure concepts, which can serve as a foundation for addressing the current gaps in the measurement of interoperability. As a first step towards achieving these goals, NQF conducted an environmental scan and key informant interviews and published the results in the interoperability **Environmental Scan Report** and the interoperability **Key Informant Interview Summary Report**. Additionally, NQF convened an expert, multistakeholder Interoperability Committee to provide input and guide the creation of a framework. Throughout this project, NQF solicited input from a multistakeholder audience, including NQF membership and public stakeholders.

The Committee developed the following set of guiding principles that define the key criteria when considering the measure concepts to guide their development into performance measures.

- Interoperability is more than EHR to EHR, and all sources of data should be taken into consideration.

- Various stakeholders with diverse needs are involved in the exchange and use of data, and the use of this framework and measure concepts will differ based on stakeholder perspectives.
- The term "electronically exchanged information" is more appropriate to completely fulfill the definition of interoperability, as it is more congruent with accepted definitions and aligns with the intent of the Shared Nationwide Interoperability Roadmap developed by ONC, which emphasizes bidirectional and multidirectional exchange among diverse information systems, and moves the framework closer to the goals described in the 21st Century Cures Act.
- Interoperability needs will differ depending on the care setting and maturity.
- All critical data elements should be included in the analysis of measures as interoperability increases access to information.

The measurement framework contains essential categories (domains) and subcategories (subdomains) needed to ensure comprehensive performance measurement of interoperability. The Committee determined the following domains and subdomains that reflect the areas that must be addressed to provide a comprehensive understanding of interoperability and its impact on health processes and outcomes.

Using these domains and subdomains, NQF worked with the Interoperability Committee to examine and develop measure concepts based on information gathered through the literature, the key informant interviews, and the individual knowledge of each of the Committee members. Additionally, NQF examined a large group of quality measures from topics gathered through the literature to identify those that are "interoperability-sensitive" measures, which are quality-of-care metrics that are potentially influenced by increased interoperability. Initially, this may be based upon interoperability between EHRs; however, interoperability-sensitive measures should cover other types of technology as well. This framework contains two distinct sections that identify both the measure concepts and measures. Appendix A includes identified measure concepts aligned with the appropriate domains and subdomains within the report along with a timeline. The estimated timeframe states whether (1) the concepts are useful in the short-term (0-3 years); (2) the concepts will be useful in the mid-term (3-5 years); or (3) the concepts are potentially implementable in the long-term (5+ years). Appendix B shows existing measures as illustrative examples of the measure concepts created by the Committee.

Domain	Subdomain
Exchange of Electronic Health Information	• Availability of Electronic Health Information • Quality of Data Content • Method of Exchange
Usability of Exchanged Electronic Health Information	• Relevance • Accessibility • Comprehensibility
Application of Exchanged Electronic Health Information	• Human Use • Computable
Impact of Interoperability	• Patient Safety • Cost Savings • Productivity • Care Coordination • Improved Healthcare Processes and Health Outcomes • Patient/Caregiver Engagement • Patient/Caregiver Experience

INTRODUCTION

The sharing and appropriate use of information, specifically electronic information, are important aspects of healthcare.[4] Digital tools can enable providers to connect and share information with other providers and specialists to guide better decision making, improve quality of care, and increase involvement of patients in their own healthcare processes. The sharing of healthcare information can also promote competition by making it easier for patients to switch between healthcare providers, and it can spur innovation in healthcare delivery by enabling providers to organize and collaborate more efficiently. As healthcare systems increase their adoption of health information technology (health IT), these systems collect a growing amount of data for clinical and administrative purposes within a healthcare environment. Healthcare industry performance depends on usable clinical information that freely flows, regardless of the type of system, organization, or geography. Healthcare organizations depend on accurate, comprehensive, efficient, and secure means for computer systems and applications to communicate and exchange clinical data to support better care management for patients, preventive care, and population health management.

The definition of interoperability for this report is the ability of a system to exchange electronic health information with and use electronic health information from other systems without special effort on the part of the user.[5] This definition is consistent with the definition used in the Nationwide Interoperability Roadmap. The 21st Century Cures Act definition of interoperability, now considered the "gold standard," outlined three distinct characteristics: (1) enables the secure exchange of electronic health information with, and use of electronic health information from, other health information technology without special effort on the part of the user; (2) allows for complete access, exchange, and use of all electronically accessible health information for authorized use under applicable state or federal law; and (3) does not constitute information blocking as defined in section 3022(a) of the legislation.[6] The interoperability measurement framework aspires to the goals described within this definition.

For two systems to be interoperable, they must be able to exchange data in an agreed-upon format according to a standard and subsequently present that data in a way that a user can understand. Data exchanged through a fax or within a portable document format (PDF) does not fall under the definition of electronically exchanged information and is not part of this framework. These devices do not collect or analyze data, and are not functionally interoperable with other electronic data systems. It is important to use the principle of "electronically-exchanged information" with those systems capable of collecting and exchanging data electronically with other systems.

In concordance with that definition of interoperability, ONC recommended standards for interoperability as part of its initiative to certify EHR technology, which facilitated the use of nationwide vocabulary and messaging standards for interoperability, both in the exchange of information and in its use. This has created a foundation on which disparate systems can use the appropriate formats and mechanisms to exchange data to assist providers, patients, and other stakeholders. However, true interoperability is a significant challenge to healthcare organizations for various reasons, including the lack of a common, standard framework that reconciles the differences in data and varying data types; incompatible products and systems; and the inability to exchange the appropriate data within healthcare organizations and with partners in their communities.

One of the goals in using health IT is to provide comprehensive information on patients at the point of care. This includes integrating information across different sources and sites when needed, so that the provider and patient can evaluate the most appropriate options for patients based on the effectiveness of treatments, including factors such as quality, risk, benefit, and cost. Currently, the promulgation of common data messaging standards and clinical vocabularies has increased interoperability, but they are not as effective as they could be for the seamless exchange and use of data to derive the maximum benefits of health IT. As the nation moves towards greater interoperability, a measurement framework that assesses the progress of interoperability and its impact would be useful.

The National Quality Forum (NQF), a consensus-based entity and an experienced convener of multistakeholder groups for developing consensus around diverse and challenging topics, has taken on a project at the request of the Department of Health and Human Services (HHS) to develop a common framework and measure concepts to serve as a foundation to address the current gaps in the measurement of interoperability and its impact. This measurement framework seeks to identify gaps where new measures need to be developed and identify suitable existing measures.

As a first step towards achieving these goals, NQF conducted an environmental scan and key informant interviews and published the results in the interoperability **Environmental Scan Report** and the interoperability **Key Informant Interview Summary Report**. Additionally, NQF convened an expert, multistakeholder Interoperability Committee to provide input and help guide the creation of a framework. Throughout this project, NQF solicited input from a multistakeholder audience, including NQF membership and public stakeholders.

In the environmental scan, NQF reviewed over 358 references and identified 77 papers that passed a scoring threshold. These papers provided research into the use and availability of data to facilitate interoperability and the different methods of exchanging information. NQF also assessed the impact on healthcare-related outcomes and processes and then used that assessment to identify existing quality measures that aligned with the reviewed articles. Since many of these articles focus on technical aspects of interoperability rather than the potential impact of interoperability, NQF did an expanded review that included papers that focus on the use, effectiveness, or outcomes of health information exchange (HIE).

The findings from the environmental scan helped inform the development of the foundational measurement framework by providing insight into the key components necessary to develop new measures that objectively assess the ability for disparate data systems to exchange information and the use of the data to affect quality of care. The key findings from the scan included:

- Interoperability supports the exchange of data across numerous systems to support areas such as public health, care coordination, patient engagement, and innovation.
- The availability of data with electronic health records (EHRs) and other systems, such as clinical data registries help support interoperability.
- Facilitating greater interoperability supports decision making by providers and patients by integrating data from various sources to present a unified view to facilitate data exchange as well as establishing common formats for care coordination, quality reporting, and collaborative care.
- Interoperability has a significant impact on the accuracy of quality measurement in areas such as cancer research, chronic disease management, and heart failure, as well as quality reporting by using common data models and application programming interfaces (APIs).

Additionally, the development of domains and subdomains of the framework assisted in understanding current quality outcome and process measures that are sensitive to interoperability that are potentially enhanced by adding data from sources outside of an electronic health record.

The key informant interviews supplemented the environmental scan. Eight key informant interview candidates came from various types of organizations—payers, health information exchanges, integrated delivery systems, health information exchange vendors, EHR/HIE vendors, informatics, and patient advocacy groups—and provided information for the report. The interviews helped identify examples of the current realities of interoperability and exchange of data across disparate systems; availability of data to facilitate interoperability; use of interoperability to facilitate decision making; and the impact of interoperability on health/health-related outcomes and processes.

To support the key findings of the environmental scan and to operationalize the framework, the informants made the following key recommendations:

- An evaluation of current outcomes and/or process measures considered for inclusion in the framework must commence to determine if the measure would benefit from interoperability.
- Current measures may not demonstrate the full spectrum that could benefit from an interoperable environment. When identifying gaps, it is best to assume that complete interoperability had been achieved as this would allow stakeholders to identify areas of measurement without the constraints of current implementation barriers.
- When evaluating both current measures and measure concepts, there is a need to create a test environment to validate interoperability-sensitive measures and to determine the data sources that capture that information. The test framework would assist in prioritizing measures by identifying those that have the most impact on clinical quality, patient experience, and reduction in the costs of care.
- The framework needs to provide guidance on how to gather high-integrity data that will provide accurate, consistent, and timely information.
- The measurement of interoperability should show both the extent to which data exchange and use leads to better outcomes as well as reduced costs.

The findings from the environmental scan, the key informant interviews, and input from a multistakeholder audience provided a strong baseline to develop a common framework and measure concepts. This framework serves as a foundation both to address the current gaps in the measurement of interoperability and help assess the impact of interoperability.

A measurement framework is a conceptual model for organizing ideas that are important to measure for a topic area and for describing how measurement should take place (i.e., whose performance should be measured, care settings where measurement is needed, when measurement should occur, or which individuals should be included in measurement). Frameworks provide a structure for organizing currently available measures, areas where gaps in measurement exist, and prioritization for future measure development. The framework must be flexible to accommodate changes in data standards, data transport mechanisms, data sources, changes in settings of care, and changes in users of these systems so that it consistently provides utility for those seeking to measure and assess the effects of interoperability and its impact on quality of care.

GUIDING PRINCIPLES

The Committee developed a set of guiding principles that define the key criteria to guide the development of measure concepts into performance measures that objectively assess the impact of interoperability on clinical outcomes and processes of care.

Interoperability Is More Than EHR to EHR

An EHR represents an individual's patient record in a digital format. EHRs are complex and comprehensive systems that collect information on medical histories, laboratory data, and medication data, as well as potentially assisting with billing, appointment scheduling, and referrals.[7] Because these systems serve as a significant source of patient data, the concept of interoperability often represents the exchanging of data across various EHR systems.

However, within the healthcare environment, various sources of patient and population data overlap in functionality with an EHR but have distinct roles and importance to the healthcare system and are critical to interoperability. These include a Qualified Clinical Data Registry (QCDR), mobile health devices (mHealth), clinical trial databases, practice management systems, and third-party payer databases, for example. Interoperability focuses equally on ensuring that patients, their families, and caregivers have full access to view, download, and exchange their health data (often through patient portals), contribute patient-generated health data to providers' EHRs, and arrange for the inclusion and exchange of data generated by multiple healthcare providers. The use of mHealth has increased significantly over the past decade, with an estimated two-thirds of all individuals within the United States currently possessing a mobile device. The applications for smartphone platforms exceed 200,000 and serve numerous purposes including chronic disease management, wellness and nutrition, and mental health, among others. The data from these applications must be well structured and normalized to transfer from the device to an EHR. Interoperability is also a key component for research and the ability of healthcare professionals to improve results. It is a significant element to acquire data from additional sources beyond the EHR, such as clinical trial databases, practice management systems, and third-party payer databases, and acquiring this data can enable analysis that is reproducible and reusable. Learning health systems, such as the Precision Medicine Initiative, illustrate such interoperability among diverse systems. The focus of interoperability within a measurement framework must extend beyond the concept of data exchange between two EHRs into one that encompasses the diversity of data sources that capture patient and population data. Figure 1 portrays this vision.

Stakeholder Involvement

A broadly accessible, interoperable system that incorporates data from various sources would potentially enable various stakeholders to participate actively in using this data. However, decisions vary based on the type of stakeholder that is involved. The impact of interoperable data affects various stakeholders in different ways, such as:

- **Patients** – An increasing body of evidence suggests the cost-effectiveness of self-care and patient engagement. Patients increasingly leverage technology platforms to access their personal data to understand their medical conditions, recommended courses of treatment, methods of self-management, and the overall price of services.[8]
- **Providers** – The mandated use of a value-based model accelerated with the implementation

of the Medicare and CHIP Reauthorization Act (MACRA). The use of interoperable data make it easier for providers to make value-based decisions and deliver high-quality care by providing critical reference and decision support at the point of care.

- **Payers** – Health plans and health service companies work with communities, employers, health professionals, hospitals, and individual consumers to modernize health promotion and disease prevention initiatives that improve healthcare outcomes and lower medical care costs. The ability to gather multiple sources of data, organize and analyze it, and create actionable knowledge optimizes the decision making of both providers and patients.
- **Government** – The federal role in healthcare has expanded over recent years and is a major factor in achieving higher quality healthcare and increased value. The ability of this stakeholder to catalyze interoperability can serve as a driver for improvement in healthcare quality and value—particularly in the efforts of prevention, health promotion, and public health surveillance—and can lead to cost savings for both public and private insurance programs.

As the measurement framework is used, each of the domains should be viewed based on the stakeholder(s) it affects and what types of changes would occur based on the overall results of the measure.

FIGURE 1. THE MULTIPLE FACETS OF HEALTHCARE INTEROPERABILITY



Use of "Outside Data"

Interoperability is sometimes referred to as the ability of systems to gather "outside data"; that is, data that do not currently reside in the host system. The ability to acquire that data and expand the information on a patient or population within that initial system is the overall goal of interoperability. However, this concept of outside data runs counter to the definition of interoperability, which refers to the ability of the different information systems to exchange data accurately, effectively, and efficiently, and in a usable form. Therefore, the characterization of "outside data" only refers to the ability of a system to collect data that it currently does not possess. It does not refer to the ability to exchange data with various systems. This measurement framework discards the phrase "outside data" and replaces it with the term "electronically exchanged information" which is more congruent with accepted definitions and aligns with the intent of the Shared Nationwide Interoperability Roadmap developed by ONC, which emphasizes bidirectional and multidirectional exchange among diverse information systems and moves the framework closer to the objectives described within the 21st Century Cures legislation.

Measures developed from concepts illustrated in this report and existing "interoperability-sensitive" measures should not be developed or used based on considerations of gathering "outside data," but rather the ability to obtain and exchange data electronically with those systems providing information necessary for the measures.

Differences Due to Setting and Maturity

The use of interoperable data may also vary based on the setting and its individualized needs; therefore, measure concepts need to be selected appropriately to fit the setting. For example, nonclinical providers and settings are working to exchange health information electronically among diverse sectors—such as housing, jails, schools, and social services—in recognition that social and environmental determinants of health are likewise critical to better healthcare and better health outcomes. The types of measure concepts selected for these settings may thus focus on interoperability of social and environmental determinants of data. In other cases, a measure concept may apply across diverse settings. For example, the use of interoperable data to enable care coordination applies to sharing of information between care teams and caregivers in a large hospital network as well as facilitating transitions between nursing homes and hospitals. Thus, careful consideration should be given to the selection of measure concepts to ensure that it applies to the setting in question.

Another point to consider is that the applicability of measure concepts will vary by the extent to which interoperability is in place within a given setting. For example, while success of interoperability may be measured by assessing interoperability-sensitive health outcomes and healthcare processes across mature organizations that have implemented interoperable systems, smaller, less sophisticated organizations that are in the early stages of implementing interoperable systems may measure their interoperability success on the availability of data to exchange and whether the functionality and capability exists to exchange data to and from multiple sources.

Various Data Types

EHRs and other healthcare systems contain various data types that are important in their representation of patients and populations. Some of the data types used for community or population health come from nonclinical sources (e.g., social determinants of health data, which can derive from systems that collect and analyze data on economic stability, education, food, and physical environment). These data reside across multiple systems and in some cases, cannot be exchanged to an EHR or other clinical information system without compromising its

content and meaning. The significance of these data is critical in both understanding and serving diverse populations with complex needs. As the use of EHRs and other systems expand beyond providing information about a single patient at the point of care to accounting for communities and populations, it is important that critical data elements are included within that analysis. Thus, as the development of measures from the measure concepts illustrated within this framework commences, an accounting of the types of data and potential methods of standardization that facilitate exchange and provide the needed information to conduct the appropriate analysis is essential.

DOMAINS AND SUBDOMAINS

After consideration of the information gathered through the environmental scan and key informant interviews, and the guiding principles, the Interoperability Committee determined that a four-domain model provided the best combination of utility, simplicity, and accuracy in identifying and covering the main components of interoperability. A domain is a categorization/grouping of high-level ideas and measure concepts that further describes the measurement framework. Along with developing high-level measurement domains, the Committee defined more in-depth subdomains that further delineate the measures and measure concepts. This model helped to frame the Committee's ideas about the measurement and evaluation of key interoperability elements.

The table below lists the domains and subdomains from the Committee:

Domain	Subdomain
Exchange of Electronic Health Information	• Availability of Electronic Health Information • Quality of Data Content • Method of Exchange
Usability of Exchanged Electronic Health Information	• Relevance • Accessibility • Comprehensibility
Application of Exchanged Electronic Health Information	• Human Use • Computable
Impact of Interoperability	• Patient Safety • Cost Savings • Productivity • Care Coordination • Improved Healthcare Processes and Health Outcomes • Patient/Caregiver Engagement • Patient/Caregiver Experience

Exchange of Electronic Health Information

The review of the literature identified that apart from the adoption of EHRs, clinical entities as well as patients, family caregivers, and others that interact with hospitals and providers face an increasing need to share information in a seamless and timely manner. Market and policy drivers include imperatives to share information across the continuum of care in support of improving coordination and reducing readmissions. The sharing of information is not limited to these two goals. It also includes other diverse medical settings including specialty hospitals, skilled nursing facilities, post-acute care providers, and mental and behavioral health providers. There are also demands to share information with individuals and their family members or caregivers to further engage them in their healthcare decisions.

The first domain focuses on the exchange of electronic health information, which creates the ability to electronically send data from its system and/or receive data it currently does not possess. A core aspect of interoperability is the availability of electronic health information when needed and the ability to move that information electronically. Without the availability of key electronic health data for key stakeholders/users to exchange information efficiently, no other aspects of interoperability are achievable. Measures in this domain revolve around how stakeholders along the care continuum can electronically send, receive, find, and use data. This domain is divided into the three subdomains: availability of electronic health information, quality of data content, and method of exchange.

Availability of Electronic Health Information

This subdomain measures the amount of healthcare data that is available and ready for electronic exchange to stakeholders/users. The literature reporting on the impacts of health information exchange suggests some potential areas where data availability could be used to accelerate interoperability, which could drive improvements in outcomes and processes. This would include measures and/or measure concepts addressing various aspects of interoperability (find, send, receive, and integrate), including an individual's ability to electronically access and view, download, and transmit (exchange) health information; who is involved in exchanging information (e.g., setting, stakeholder), including staff training; and the types of data that are exchanged. Additionally, measure concepts that assess the privacy and confidentiality of personal health information that are exchanged fall under this subdomain.

Quality of Data Content

This subdomain measures the extent to which appropriate information (e.g., precision and specificity) is electronically exchanged. This includes measures and/or measure concepts addressing electronically exchanged data content that was valid, accurate, and directly related to the patient, as well as assessing the quality of data within an EHR and processes that lead to poor data quality.

Method of Exchange

This subdomain measures the amount of information and in what format (i.e., structurally recognized standard) the electronic health data are being exchanged, or the extent to which an application programming interface (API) accesses information directly. This includes measures and/or measure concepts addressing data security, and the implementation and use of standards, including the adherence to messaging and vocabulary standards. The conformance and use of stakeholders within a trust framework is also included within this subdomain.

Usability of Exchanged Electronic Health Information

While the first domain focuses on the ability to exchange information amongst stakeholders, the second domain of usability of exchanged electronic health information focuses on the ability of the stakeholder to acquire and use the data when and where needed. Exchanged electronic health information should be made available to the stakeholder in a timely manner with content and format that is appropriate to support a healthcare decision. Measures and/or measure concepts in this domain serve as indicators of the degree to which the right information is available at the right time and the right place for decision making or other actions. This domain is divided into the following three subdomains: relevance, comprehensibility, and accessibility.

Relevance

This subdomain measures the clinical content of the exchanged information and whether it meets the needs or expectations of that stakeholder to support a healthcare decision. This would include measures and/or measure concepts around the utility of the clinical data among a variety of stakeholders.

Accessibility

This subdomain measures the ability of stakeholders to access the information that is exchanged. This would include measures and/or measure concepts concerning how that information is integrated within the clinical workflow, the timeliness of the information, and the clinical completeness of the data.

Comprehensibility

This subdomain measures the ability of stakeholders to understand the exchanged information. This includes measures and/or measure concepts addressing the presentation format (e.g., is the data presented in a concise, yet comprehensive format).

Application of Exchanged Electronic Health Information

The previous domains measure the electronic exchange of data and whether the data contain the pertinent information for making health decisions. Beyond the exchange of usable data that are relevant for a clinical decision, another major objective of interoperability is to ensure effective use of exchanged electronic health information. Measures in this domain will assess whether exchanged electronic health information is used to inform, to participate directly in decision making, and to provide data for algorithms which support decision making and aggregation, which supports population health and other actions. This domain is divided into the following subdomains: human use and computable.

The NQF literature review found several studies and reports that illustrated how exchanging data between heterogeneous systems provided comprehensive clinical information for patients with varying clinical conditions, such as end-stage renal disease (ESRD), diabetes care, cancer testing, and personalized patient care. Examples of human use of exchanged information within the literature included a demonstration of methods creating a standardized mapping of cardiology elements to report in a patient record, and a way of incorporating environmental factors with clinical data elements relating to hypertension. An example of computable application of exchanged information from the literature included an ability to take free-text information from prescription drug labels and identify drugs with indications specific to certain dose forms or strengths and include those within an EHR.

Human Use

This subdomain measures the human use of exchanged electronic health information including viewing, interpreting, and applying the data to decisions or other actions. This includes measures and/or measure concepts that address the extent to which the exchanged electronic health

information supports clinical reasoning and decision making for individuals, patients, and/or caregivers.

Computable

This subdomain measures the use of exchanged information for computational tasks including clinical decision support, calculation of quality metrics, and other data analytics. This includes measures and/or measure concepts addressing the level of processing that can occur due to the presence of exchanged electronic health information.

Impact of Interoperability

The fourth domain focuses on the impact of interoperability, which represents how interoperability affects the healthcare system. Measures in this domain will serve as indicators that interoperability made an impact and improved care. This domain assumes the other three domains are functioning. In other words, health information was electronically exchanged; the information was deemed usable; and it was applied or used for some health-related purpose. The Committee divided this domain into seven separate subdomains that were considered sensitive to interoperability: patient safety, cost savings, productivity, care coordination, improved healthcare processes and health outcomes, patient/caregiver engagement, and patient/caregiver experience.

While there are limited metric sets to evaluate the impact of interoperability, the literature identified several studies demonstrating how the interoperable exchange of data can affect quality-of-care measures. These were either process measures (a healthcare-related activity that leads to an outcome) or outcome measures (used to evaluate treatment and progress efficacy). Additionally, the literature identified how greater interoperability between systems may reduce gaps in missing information enabling care coordination and improving patient safety.

Patient Safety

This subdomain addresses patient safety issues, which are affected by the availability of electronically exchanged health information. This includes measures and/or measure concepts addressing adverse drug events, appropriate medication management, medication reconciliations, and cumulative radiation exposure.

Cost Savings

This subdomain addresses the ability to reduce spending and increase value that is affected by the availability of electronic health information. This includes measures and/or measure concepts addressing duplication and redundancy in labs, imaging, and other services.

Productivity

This subdomain addresses enhanced productivity that is facilitated by available exchanged electronic health information. This includes measures and/or measure concepts addressing time spent manually searching or collecting the information needed to appropriately take care of the patient (e.g., rework and waste).

Care Coordination

This subdomain addresses care coordination between different providers, different care settings, and with the patient/family/caregiver that is affected by the availability and use of electronic health information. This includes measures and/or measure concepts addressing closed loop referrals to providers, access to longitudinal care plans, and communication of patient information to another provider.

Improved Healthcare Processes and Health Outcomes

This subdomain addresses the ability for exchanged data to demonstrate a positive impact on healthcare processes and health outcomes. This includes measures and/or measure concepts

addressing readmissions and appropriately recommended screenings/tests/images.

Patient/Caregiver Engagement

This subdomain addresses how patients' and caregivers' access to and use of personal electronic health information and electronic health tools affects their ability and desire to be active partners in their own health or the health of someone under their care. This includes measures and/or measure that assess the impact of consumers' access and use of interoperable data on shared decision making, adherence to treatment, and change of health behaviors.

Patient/Caregiver Experience

This subdomain addresses patients' and caregivers' experience with exchanging, accessing, and using personal electronic health information and electronic health tools (i.e., not bringing chart, sharing of data with provider, and others); the ability for patients to move between providers more readily (enhanced access to care); as well as general satisfaction with a system that has high (or low) levels of interoperability.

MEASURES AND MEASURE CONCEPTS

NQF worked with the Interoperability Committee to examine and develop measure concepts based on information gathered through the literature, the key informant interviews, and the individual knowledge of each of the Committee members. Additionally, NQF examined a large group of quality measures based on the topics gathered through the literature to identify those that would be "interoperability-sensitive"; that is, where determination of the numerator for a measure requires the use of data that are produced external to the entity reporting the measure. These data may be acquired by electronic exchanged or other methods; therefore, the measure is sensitive and not dependent on interoperability. Within this framework, there are two distinct sections that identify the measure concepts and measures.

A measure concept is an idea for a measure that includes a description of the measure, including a planned target and population. The findings from the environmental scan, the key informant interviews, and the Committee in-person meeting informed the development of measure concepts by providing insight into the key components necessary to develop new measures that objectively assess the ability for disparate data systems to exchange information and the use of the data to affect quality of care. Appendix A identifies the measure concepts with the appropriate domains and subdomains along with an estimated timeframe and potential data source. The estimated timeframe states whether (1) the concepts are useful in the short-term (0-3 years); (2) the concepts will be useful in the mid-term (3-5 years); or (3) the concepts are potentially implementable in the long-term (5+ years). Given the rapid advancements in EHR systems and the goals and objectives of 21st Century Cures Act, it is important to assess the applicability of measure concepts based on the current and future state of interoperability to prioritize measure development.

Another important consideration in implementing this framework and developing measures is minimizing provider burden. Where possible, measures should be developed in a manner that leverages existing data sources, such as national surveys conducted by ONC that currently measure and report on interoperability from provider and consumer perspectives, as well as system generated data. New data collection efforts that increase provider burden should be avoided where possible.

The measure concepts contain interdependencies within their domains that affect their eventual implementation and use (e.g., you must have access to the data for exchange before appropriately evaluating usability). In developing measures from the concepts, it is important to understand the dependencies when evaluating interoperability, which domains are critically important, and which differ across stakeholders and organizations.

A measure is a fully developed metric that includes detailed specifications and may have undergone scientific testing. NQF replicates the methodology used by Kern, Pincus, et al. that focused on the examination of ambulatory care quality metric sets that were sensitive to improvements in quality facilitated by healthcare interoperability. NQF expanded this methodology to include hospital-based metrics and reviewed over 600 electronic clinical quality measures, evaluating them based on data applicability, data availability, data timeliness, and data accuracy. NQF and the Committee conducted both the review and evaluation.

Appendix B shows existing measures to represent illustrative examples of the measure concepts created by the Committee. This is not an exhaustive set of quality measures, and they

may not be susceptible to the guiding principles, in that they cannot always deviate based on stakeholder or setting and thus may not be good, independent markers as to the progress and use of interoperable systems. Additionally, the measures themselves may be sensitive to the data captured within an EHR and other secondary systems, but may not provide a metric that discerns whether interoperability provided any benefit, or whether the benefits came from other factors, such as better data collection strategies. Thus, the measures represent examples of the measure concepts so that future measure development can adjust or expand those measures to reflect the domains and subdomains of the framework, as well as adhere to the guiding principles.

It is also important to note that ONC convened a national community of practice (CoP) addressing exchange and interoperability measurement in early 2015. A final report entitled, *Measuring Nationwide Progress: Interoperability and Exchange of Health information*, documents the current state of exchange measurement in three domains: (1) capability for interoperable exchange; (2) information flow and usage of interoperable information; and (3) impacts of exchange and interoperability on improved healthcare. Additionally, the ONC report documents the types of interoperability-specific measures that are in current use, and a discussion of the cross-cutting challenges that are associated with measuring progress in exchange and interoperability.[9] These measures serve as additional examples of the measure concepts and are available in a **spreadsheet online** that captures the proposed measures, what area of interoperability they assess and evaluate, and their overall usability.

Additionally, this specific project focuses on an organizational framework to assist in the development of measures to assess interoperability and its impact on healthcare processes and outcomes. It is somewhat different from ONC's current standards measurement framework, which is designed to assess the implementation and use of healthcare interoperability standards in order to measure interoperability progress. However, the two projects are interrelated in that the assessment of the use of national messaging standards and clinical vocabularies assist in the development of robust measures that specifically evaluate the overall impact of interoperability. Furthermore, the Assistant Secretary for Planning and Evaluation (ASPE) of HHS undertook two projects: (1) to develop a use case method for assessing interoperability and (2) to measure interoperability in settings and populations not included in the Meaningful Use requirements under the Health Information Technology for Economic and Clinical Health (HITECH) Act. While these projects all have the intent of assessing interoperability, the interoperability measurement framework specifically organizes measure concepts around specific domains and subdomains of information designated by the Committee as not only important for evaluating interoperability, but also its impact on healthcare quality processes and outcomes. The work developed by ASPE,[10] however, serves as a foundation for potentially incorporating these findings into the measures developed from the concepts, as well as providing essential information for future work in this area.

FUTURE CONSIDERATIONS

Both the Committee and NQF realize that this measurement framework does not cover all of the issues pertaining to interoperability, and is a beginning towards understanding the development of measures to assess both the current state of interoperability and its impact on quality processes and outcomes. There are numerous issues to consider for future work within the framework as it continues to evolve and expand as interoperability continues to progress. Some of these issues include:

- Interoperability measure concepts are included that go beyond just ambulatory and inpatient settings, but also areas such as mental and behavioral health, long-term/post-acute care, home health, and home and community-based services, among others.
- The framework is expanded to include medical devices, mobile health, research databases and other internet-based tools used for healthcare.
- The inclusion of measure concepts associated with a testing environment to assess conformance to interoperability standards.
- The inclusion of a library of use cases that demonstrate the application and effectiveness of the framework across different care settings and populations.

The interoperability measurement framework represents a significant step in advancing interoperability within a diverse set of both healthcare settings and systems. This framework provides an objective and independent assessment as to the progress of interoperability, its impact on healthcare processes and outcomes, and what areas need improvement. The measure concepts developed through the Committee are wide reaching to cover large number of stakeholders and care settings, each of which could benefit from interoperability in the provision of individual care as well as care for populations. It is a framework that is accessible, usable now and in the future, and provides a foundation on which to advance and evaluate interoperability for years to come.

ENDNOTES

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APPENDIX A:
List of Measure Concepts

This table lists the proposed measure concepts recommended by the Committee, the domain and subdomain to which they belong, the estimated time frame for when the concepts would be useful, and whether the data source for the measure concept would be system-generated or would come from a survey.

Domain	Subdomain	Measure Concept	Estimated Timeframe	Data Source
Exchange	Availability of Electronic Health Information	Were the clinical staff trained on accessing data?	Short-Term	Survey
Exchange	Availability of Electronic Health Information	Content of health information exchanged per month per patient and to what stakeholder	Short-Term	Survey
Exchange	Availability of Electronic Health Information	Patients who could electronically view, download, and transmit health information from their own site	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Picture Archiving and Communication Systems (PACS) images that were sent or accessible between electronic health record systems.	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Specific data elements that were captured electronically but not exchanged between at least two entities	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Percentage of available structured elements that were electronically exchanged per patient	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Percentage of EHR systems generating Continuity of Care Documents (CCD) or Continuity of Care Record (CCR) to exchange	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Number and type of users electronically sending, receiving, or searching for patient health information in a structured format.	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Amount of provider time spent searching for information that could have been available electronically (e.g., allergies, immunizations)	Short-Term	Survey
Exchange	Availability of Electronic Health Information	Number of clicks and/or sign-ons a provider has to do when accessing available information	Short-Term	System-Generated
Exchange	Availability of Electronic Health Information	Amount of time a provider had to spend searching for available information	Short-Term	Survey

Domain	Subdomain	Measure Concept	Estimated Timeframe	Data Source
Exchange	Availability of Electronic Health Information	Frequency of gaps within information exchange among different patient and provider populations	Short-Term	System-Generated
Exchange	Quality of Data Content	Percentage of available, electronically exchanged data elements that were valid and related directly to the patient	Short-Term	System-Generated
Exchange	Quality of Data Content	Available, electronically exchanged data elements received from the sender that were a direct match to the patient	Short-Term	System-Generated
Exchange	Method of Exchange	Frequency by which an end-user was able to negotiate data exchange	Mid-Term	System-Generated
Exchange	Method of Exchange	Percentage of applicable standards recommended by the U.S. Department of Health and Human Services (HHS) that are implemented	Short-Term	System-Generated
Exchange	Method of Exchange	Amount of health data exchange done through application programming interfaces (APIs) conforming to nationally certified standards through the Department of Health and Human Services (HHS)	Short-Term	System-Generated
Exchange	Method of Exchange	Number of systems adopting certified messaging and vocabulary standards recommended by the U.S. Department of Health and Human Services (HHS) for diagnoses, procedures, medications, lab orders, and results	Short-Term	System-Generated
Exchange	Method of Exchange	The use of nationally recognized standards and clinical vocabularies within a clinical environment to communicate with nonclinical systems	Long-Term	Survey
Usability	Relevance (access)	Frequency of electronically exchanged information that has been viewed	Short-Term	System-Generated
Usability	Relevance (accuracy)	Users who had an available, relevant minimum data set that were electronically exchanged for the decision/action	Short-Term	System-Generated
Usability	Relevance (accuracy)	Electronically exchanged structured elements present for a given decision/ action	Mid-Term	System-Generated
Usability	Relevance (access)	Number of times a complete and current medical record was accessible to both a patient and a provider during a clinical encounter	Short-Term	System-Generated
Usability	Relevance (accuracy)	How often information accessed by a provider was out of date	Short-Term	System-Generated
Usability	Comprehensibility	Information was not concise and was difficult to understand	Short-Term	System-Generated

Domain	Subdomain	Measure Concept	Estimated Timeframe	Data Source
Usability	Comprehensibility	How often information was difficult to understand for other reasons (reasons should be defined)	Short-Term	Survey
Usability	Accessibility	Number of times that users induce errors because of user interface design	Short-Term	System-Generated
Usability	Accessibility	The frequency and severity of user errors that led to adverse events	Short-Term	System-Generated
Usability	Accessibility	Frequency and types of events that may indicate problems users are having with the system (e.g., use of workarounds, redundancies, burnout, patient safety events related to user interface, or low task completion rate)	Short-Term	System-Generated
Usability	Accessibility	Frequency and type of adverse event caused by user error (e.g., wrong patient – actions of commission or omission, wrong treatment – actions of commission or omission, or delay of treatment).	Short-Term	System-Generated
Application	Computable	Data could not be parsed or interpreted by a receiving system	Short-Term	System-Generated
Application	Computable	Percentage and frequency of quality metrics generated with electronically exchanged discrete data	Short-Term	System-Generated
Application	Computable	Number of medication discrepancies among different medication lists (i.e., pre-admission list, home medication list, etc.)	Short-Term	System-Generated
Application	Human Use	Frequency of reconciliation/incorporation of electronically exchanged information	Short-Term	System-Generated
Application	Human Use	Frequency of electronically exchanged structured elements data used in a clinical decision/action	Long-Term	System-Generated
Impact	Care Coordination	Number of longitudinal care plans that both patients and clinicians use in the delivery of care	Long-Term	System-Generated
Impact	Care Coordination	Percentage of closed loop referrals where electronic health information is sent and received	Short-Term	System-Generated
Impact	Cost Savings	Presence of potentially duplicate labs/ imaging	Mid-Term	System-Generated
Impact	Cost Savings	Percentage of reduction of duplicate labs and imaging over time on provider and payer side	Mid-Term	System-Generated
Impact	Patient/Caregiver Engagement	Patients who set and track their individual health goals among those who electronically access their health information	Short-Term	Survey

Domain	Subdomain	Measure Concept	Estimated Timeframe	Data Source
Impact	Patient/Caregiver Engagement	Patients who adhere to treatment among those who electronically access their health information.	Short-Term	Survey
Impact	Patient/Caregiver Engagement	Number of patients that reviewed and used their medical records	Short-Term	System-Generated
Impact	Patient/Caregiver Engagement	Number of care plans that communicate the patient/caregiver health goals and concerns across providers treating the patient.	Mid-Term	Survey
Impact	Patient/Caregiver Engagement	Impact of patients' use of their health information (e.g., shared decision making, medication adherence, patient activation, change of health behaviors)	Mid-Term	Survey
Impact	Patient/Caregiver Experience	Patient/caregiver satisfaction with the transfer of personal electronic health information from provider to provider	Mid-Term	Survey
Impact	Patient/Caregiver Experience	Patient/caregiver satisfaction with provider care due to provider having personal electronic health information from another provider	Mid-Term	Survey
Impact	Patient/Caregiver Experience	How often patient's experience includes increased electronic access to their health information, which increases their participation in shared decision making with the clinical care team	Short-Term	Survey
Impact	Patient/Caregiver Experience	How often patient's experience includes increased electronic access to their health information as well as electronic tools to improve health behaviors	Short-Term	Survey
Impact	Patient/Caregiver Experience	Number of instances a patient was able to access their information across multiple providers.	Long-Term	System-Generated
Impact	Patient Safety	Number of instances a prescribed medication was not given for patient who came from an outside healthcare facility	Mid-Term	System-Generated
Impact	Patient Safety	Number of adverse drug events with newly prescribed drugs where offending other drug not in prescriber's EHR	Mid-Term	System-Generated
Impact	Patient Safety	Reduction of provider identified errors in the patient's medical record	Short-Term	System-Generated
Impact	Productivity	Overall amount of time that a look-up is done outside of an EHR for prior outside imaging studies, lab orders, or medications, before ordering a new imaging study, labor order, or prescription	Long-Term	Survey

APPENDIX B:
List of Existing Measures

This table provides a list of existing quality measures, the measure concept for which they serve as an example, the appropriate domain and subdomain to which the measure belongs, and the source of the measure.

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Exchange	Availability of Electronic Health Information	Number of longitudinal care plans that both patients and clinicians have access to and use in the delivery of care	MU/ACI objective on coordination of care through patient engagement: percentage of transitions of care and referrals where the receiving provider has never encountered the patient before and requests and incorporates the patient's electronic summary of care record into the EHR	www.ascrs.org MIPS Program: 2017 Advancing Care Information Category
Exchange	Availability of Electronic Health Information	The patient's experience includes increased electronic access to their health information, which increases their participation in shared decision making with the clinical care team.	MU/ACI objective on coordination of care through patient engagement: Percentage of patients where patient-generated health data is incorporated into the CEHRT	www.ascrs.org MIPS Program: 2017 Advancing Care Information Category
Exchange	Availability of Electronic Health Information	The patient's experience includes increased electronic access to their health information, which increases their participation in shared decision making with the clinical care team.	MU/ACI measure for patient access: percentage of patients (or patient authorized representatives) who are provided timely access to view online, download, and transmit his or her health information; and the patient's health information is available to access using any application of their choice that is configured to meet the technical specifications of the application programming interfaces (API) in the provider's CEHRT	www.ascrs.org MIPS Program: 2017 Advancing Care Information Category
Exchange	Availability of Electronic Health Information	Were the clinical staff trained on data exchange?	CPC+ Regional Learning Faculty training record for care coordination milestone	innovation.cms.gov CPC (Comprehensive Primary Care) Milestones
Exchange	Quality of Data Content	Percentage of available, electronically exchanged data elements that were valid and related directly to the patient	MU/ACI objective on coordination of care through patient engagement: percentage of patients where data from a nonclinical setting is incorporated into the CEHRT	www.ascrs.org MIPS Program: 2017 Advancing Care Information Category

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Exchange	Method of Exchange	Percentage of business agreements (BA) between trading partners to exchange data that were not completed, improperly executed, or became inactive.	Public Reporting of Direct Trust aggregated HISP statistics	www.directtrust.org Directory Data Aggregation Service
Impact	Care Coordination	Number of instances a medication was not given for patient who came from outside healthcare facility	Venous thromboembolism (VTE) diagnosis and treatment: percentage of patients with any of these diagnoses—VTE, PE, DVT—indicating a complete list of medications was communicated to the next clinician of service when the patient is referred or transferred to another setting, service, practitioner, or level of care within or outside the organization	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Care Coordination	Frequency of reconciliation/ incorporation of electronically exchanged information	Pressure ulcer prevention and treatment protocol: percentage of patients with documentation in the medical record that communication of a transfer/ discharge plan for patients with a pressure ulcer(s) took place addressing skin status and the pressure ulcer prevention plan when transferring patient care to another care provider	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Care Coordination	Frequency of reconciliation/ incorporation of electronically exchanged information	Oncology: percentage of patients, regardless of age, with a diagnosis of cancer who have undergone brachytherapy or external beam radiation therapy who have a treatment summary report in the chart that was communicated to physician(s) providing continuing care and to the patient within one month of completing treatment	www.qualityforum.org/ QPS NQF Quality Positioning System

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Impact	Care Coordination	Percentage of users who had an available, relevant minimum data set that was electronically exchanged for the decision/action (completeness)	Emergency department transfer communication: percentage of patients transferred to another healthcare facility whose medical record documentation indicated that all the relevant elements were communicated to the receiving hospital within 60 minutes of discharge	www.qualityforum.org/QPS NQF Quality Positioning System
Impact	Care Coordination	Percentage of available, electronically exchanged data elements that were valid and related directly to the patient	Adult depression in primary care: percentage of patients with major depression or persistent depressive disorder whose primary care records show documentation of any communication between the primary care clinician and the mental healthcare clinician	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Number of medication discrepancies among different medication lists (i.e., pre-admission list, home medication list, etc.)	Use of appropriate medications for people with asthma: percentage of patients 5 to 64 years of age during the measurement year who were identified as having persistent asthma and who were appropriately dispensed medication during the measurement year	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Percentage of Picture Archiving and Communication Systems (PACS) images that were sent between systems	Prostate cancer: percentage of patients, regardless of age, with a diagnosis of prostate cancer at low risk of recurrence receiving interstitial prostate brachytherapy, OR external beam radiotherapy to the prostate, OR radical prostatectomy, OR cryotherapy who did not have a bone scan performed at any time since diagnosis of prostate cancer	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Improved Healthcare Processes and Health Outcomes	Number of EHR systems generating Continuity of Care Documents (CCD) or Continuity of Care Record (CCR) to exchange	Preventive services for adults: percentage of patients ages 50 to 75 years who have one or more of the following screenings: colonoscopy in past 10 years, flexible sigmoidoscopy in past five years, and fecal occult blood test (FOBT) annually	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Impact	Improved Healthcare Processes and Health Outcomes	Number of EHR systems generating Continuity of Care Documents (CCD) or Continuity of Care Record (CCR) to exchange	Preventive services for adults: percentage of female patients age 45 years and older who have lipid screening every five years	uspreventiveservices-taskforce.org Lipid Disorders in Adults
Impact	Improved Healthcare Processes and Health Outcomes	The patient's experience includes increased electronic access to their health information and electronic tools, which increases the frequency with which they set and track their individual health goals	Prevention and management of obesity for adults: percentage of patients with a BMI greater than or equal to 25 who received education and counseling for weight management strategies that include nutrition, physical activity, lifestyle changes, medication therapy, and/or surgical considerations	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Impact of patients' use of their health information (e.g., shared decision making, medication adherence, patient activation, change of health behaviors)	Pressure ulcer prevention and treatment protocol: percentage of inpatients with pressure ulcer(s) whose medical record contains documentation of a comprehensive patient assessment and thorough wound evaluation.	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Percentage of available relevant structured elements that were electronically exchanged per patient	Major depressive disorder (MDD): percentage of medical records of patients aged 18 years and older with a diagnosis of MDD and a specific diagnosed comorbid condition (diabetes, coronary artery disease, ischemic stroke, intracranial hemorrhage, chronic kidney disease [stages 4 or 5], ESRD or congestive heart failure) being treated by another clinician with communication to the clinician treating the comorbid condition	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Type of health information exchanged per month per patient and to what stakeholder	Lipid management in adults: percentage of patients with established atherosclerotic cardiovascular disease (ASCVD), or 10-year CHD risk greater than or equal to 10%, or diabetes and on lipid-lowering medication who have a fasting lipid panel within 24 months of medication prescription	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of electronically exchanged discrete data used in a clinical decision	Lipid management in adults: percentage of patients with established ASCVD, or a 10-year CHD risk greater than or equal to 10%, or diabetes on lipid-lowering medication and most recent LDL greater than 100 mg/dL, who are prescribed a maximal recommended dose of a potent statin (such as simvastatin, pitavastatin, rosuvastatin, or atorvastatin)	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of electronically exchanged discrete data used in a clinical decision	Heart failure: percentage of patients aged 18 years and older with a diagnosis of heart failure with a current or prior LVEF less than 40% who were prescribed beta-blocker therapy either within a 12-month period when seen in the outpatient setting or at each hospital discharge	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of reconciliation/ incorporation of electronically exchanged information	Heart failure: percentage of patients aged 18 years and older with a diagnosis of heart failure with a current or prior left LVEF less than 40% who were prescribed ACE inhibitor or ARB therapy either within a 12-month period when seen in the outpatient setting or at each hospital discharge	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of electronically exchanged discrete data used in a clinical decision	Heart failure in adults: percentage of patients with heart failure diagnosis who have a follow-up appointment with their primary care clinician within seven days of hospital discharge	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Percentage of Picture Archiving and Communication Systems (PACS) images that were sent between systems	Diagnostic imaging: percentage of patients undergoing a screening mammogram whose information is entered into a reminder system with a target due date for the next mammogram	www.qualityforum.org/ NQF Quality Positioning System (QPS)

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Impact	Improved Healthcare Processes and Health Outcomes	Percentage of Picture Archiving and Communication Systems (PACS) images that were sent between systems	Diagnostic imaging: percentage of imaging studies for patients aged 18 years and older with shoulder pain undergoing shoulder MRI, MRA, or a shoulder ultrasound who are known to have had shoulder radiographs performed within the preceding 3 months based on information from the radiology information system (RIS), patient-provided radiological history, or other healthcare source	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Percentage of users who had an available, relevant minimum data set that was electronically exchanged for the decision/action (completeness)	Diagnosis and management of chronic obstructive pulmonary disease (COPD): percentage of COPD patients who require hospital admission/readmission for COPD-related exacerbations in one month	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of reconciliation/ incorporation of electronically exchanged information	Comprehensive adult diabetes care: percentage of patients 18 to 75 years of age with type 1 or type 2 diabetes who had an eye exam (retinal) performed	www.qualityforum.org/ QPS NQF Quality Positioning System
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of reconciliation/ incorporation of electronically exchanged information	Care for older adults: percentage of adults 66 years and older who had a medication review during the measurement year	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Improved Healthcare Processes and Health Outcomes	Percentage, frequency of electronically exchanged information that has been viewed	Cardiac care: percentage of patients with early complications after permanent pacemaker (PP) implantation	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of reconciliation/ incorporation of electronically exchanged information	Cancer screening: percentage of women aged 51 to 74 years who have had at least one mammogram performed during the measurement year or the year prior to the measurement year	www.qualityforum.org/ NQF Quality Positioning System (QPS)

Domain	Subdomain	Relevant Measure Concept	Existing Measure	Source of Measure
Impact	Improved Healthcare Processes and Health Outcomes	Frequency of reconciliation/ incorporation of electronically exchanged information	Cancer screening: percentage of individuals aged 50 to 74 years who had a fecal occult blood test (FOBT) performed during the measurement year or a colonoscopy during the previous nine years (including the measurement year)	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Improved Healthcare Processes and Health Outcomes	Type of health information exchanged per month per patient and to what stakeholder	All-cause readmissions: the number of acute inpatient stays during the measurement year that were followed by an acute readmission for any diagnosis within 30 days and the predicted probability of an acute readmission, for patients 18 years of age and older	www.qualityforum.org/ NQF Quality Positioning System (QPS)
Impact	Patient Safety	Percentage of times that a look-up is done for prior outside imaging studies before ordering a new imaging study	Search for Prior Computed Tomography (CT) Studies through a Secure, Authorized, Media-free, Shared Archive	www.acr.org The American College of Radiology
Impact	Patient Safety	Number of adverse drug events with newly prescribed drugs where offending other drug not in prescriber's EHR	Potentially harmful drug-disease interactions in the elderly: percentage of Medicare patients 65 years of age and older who have evidence of an underlying disease, condition, or health concern and who were dispensed an ambulatory prescription for a potentially harmful medication, concurrent with or after the diagnosis	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Patient Safety	Number of medication discrepancies among different medication lists (i.e., pre-admission list, home medication list, etc.)	Medication reconciliation post-discharge: percentage of discharges from January 1 to December 1 of the measurement year for patients 66 years of age and older for whom medications were reconciled on or within 30 days of discharge	qualitymeasures.ahrq.gov Agency for Healthcare Research and Quality National Quality Measures Clearinghouse
Impact	Patient Safety	Percentage of times that a look-up is done for prior outside imaging studies before ordering a new imaging study	Computed Tomography (CT) images available for patient follow-up and comparison purpose	www.acr.org The American College of Radiology

APPENDIX C:
Interoperability Committee Roster and NQF Staff

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APPENDIX D:
Summary of Public Comments

AHIMA

I am submitting these comments as my personal feedback on the important document that NQF published. These comments do not represent opinion of AHIMA or AHIMA members on the NQF document.

Title

I believe that the title is misleading. The document does not contain the "measurement framework" but the observations for the topics that should be included in/inform the development of such framework. I would rename the document by adding "building" or "towards to" at the beginning of the title as follows:

"Building" or "Towards to" a Measurement Framework to Assess Nationwide Progress Related to Interoperable Health Information Exchange to Support the National Quality Strategy."

Definitions

The document does not contain the formal definition of interoperability. It refers to IEEE definition used by ONC, but this definition is deficient as it focuses on technical aspects of interoperability only.

AHIMA (URL: http://bok.ahima.org/PdfView?oid=300817) provided definitions for:

• Interoperability

• Levels of Interoperability

• Interoperability Standards and

• Use Case and National Priority Use Cases

"Interoperability" means the ability to communicate and exchange data accurately, effectively, securely, and consistently with different information technology systems, software applications, and networks in various settings, and exchange data such that clinical or operational purpose and meaning of the data are preserved and unaltered."

HL7's approach to interoperability is based on the following three interoperability components (pillars) that specifically focus on the ONC identified barriers 1--3 under "current context" above:

Semantic interoperability—shared content

Technical interoperability—shared information exchange infrastructure

Functional interoperability—shared rules of information exchanges, i.e., business rules and information governance ("the rules of the road").

I believe that HL7 definition of interoperability and its interoperability pillars have to be reflected in the Interoperability Measurement Framework.

Interoperability Standards. In 2005, health Information technology Standards Panel (HITSP) identified the following categories of standards:

Data Standards

Information Content Standards

Information Exchange Standards

Identifiers Standards

Privacy and Security Standards

Functional Standards

Business Standards

The NQF document inconsistently mentions some of these standards. The true interoperability cannot be achieved without ALL these standards to be harmonized to work together.

Use Cases. I believe that the NQF framework will benefit greatly from identifying/applying the use cases as specific examples for the measures of interoperability/information sharing via the means of HIT.

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

AHIMA

Focus on inconsistent four ONC Interoperability Roadmap's domains creates inconsistencies in the NQF framework as well as follows:

TABLE 1. focused in technical interoperability only; where is "capture"; what if data are not even collected to send, receive, find and use?

Examples are not comprehensive; where is notification of data availability, acknowledgement of data receipt and other interoperability steps that create trusted information

What standards are referenced? What does this statement mean: "use of standard data formats and technologies, such as direct to provide a common framework" and other statements that refer to standard…

TABLE 2. This table present examples of possible use cases, however, presented classification is inconsistent

why "Lab results sent to public health agencies" is under public health but not also in care coordination or integration; there are many examples of statements that may belong to various sub-groups

why care coordination does not include lab results sent to ordering provider?

innovation section contains highly research areas for which national consensus and/or interoperability standards are not available, e.g., enhanced lab report, better understanding of comorbidities, more effective screening, better understanding of event and medical causes, etc. – these topics can be premature for inclusion into measure development

statements like "reduction in", "real-time", "assurance of screening", "greater accuracy, "more effective" have to be well defined before the interoperability standards for them and corresponding measures could be developed

why device related statements are listed in two different group:

Integrating a medical device into an EHR is under "interoperability enabled process" (what does the latter mean? Why this is not integration?)

Use of standardized medical reports with data from medical devices is under "integration"

And so on

TABLE 3. This table presents examples and the way of prioritizing the possible clinical use cases/domains however the number of publications is very limited to make prioritization.

TABLE 5.Categories under Dimension column are: Data Sources, Integration, Aggregation, Transport, Standardization, Measurement

Where is the purpose (use cases) for which these 6 activities are performed

TABLE 6. Categories under Dimension column are: Data sources, Integration, Connectivity, Measurement, Aggregation

Where is the purpose (use cases) for which these 5 activities are performed

Why 5 not 6 as above in Table 5? Where is standardization?

Why Connectivity not Transport?

Is care continuum a main source of LHS data? Why separate tables?

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work. The framework was designed as a method to present high-level measure concepts to allow developers to create numerous versions within a domain/subdomain.

Allscripts

Comments on "Number of data elements that could not be parsed or interpreted by a receiving system":

- Will validation report for CCDAs suffice?
- It is not clear from which item(s) this will be derived/parsed. Will this be parsed from HL7 interfaces feeds? C-CDA exchange?
  - Different sources have different requirements for parsing.
  - Parsed for what purpose? Incorporation, Display, both? This needs clarification
- The validation of C-CDAs is required. Would this be counting the number of data elements that generated errors and warnings per C-CDA?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of systems adopting certified messaging and vocabulary standards recommended by HHS for diagnoses, procedures, medications, lab orders, and results":

- Measures are driven by ONC Health IT certification program that defines the certified status - how is this different?
  - CCDA validation is an example criteria that validates conformance to vocabulary standards. Why duplicate effort here?
- This seems like a healthcare industry level analysis. Who would do this analysis?
- What is meant by 'certified messaging'? Is it Secure Electronic Messaging? Is it transmission and/or receipt of C-CDAs?
- How would this be measured? It would require parsing of the XML code to assess.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Frequency of electronically exchanged information that has been viewed":

- Will audit logs suffice? Need to clarify the scope/ intent.
- Need to clarify the audience - who would be needing to view the information?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Reduction of provider identified errors in the patient's medical record":

- It is not clear how this could be measured - additional guidance would be required.
- It is quite possible that this would not be something recorded in the EHR. It would be something managed by a risk management or HIM department.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "The use of nationally recognized standards and clinical vocabularies within a clinical environment to communicate with nonclinical systems":

- What is meant by a nonclinical system? It is hard to provide feedback without clarity on this.
- Measures are driven by ONC Health IT certification program that defines the certified status - will that not be sufficient to track the conformance
  - specifically, CCDA validation is an example criteria that validates conformance to vocabulary standards. This appears that it may duplicate effort.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a

measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Users who had an available, relevant minimum data set that were electronically exchanged for the decision/action":

- Need to define "relevant minimum"
  - This may vary from one patient to other - unless we only are talking about CCDS.
- Need to define the decisions/actions to be considered.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Amount of time a provider had to spend searching for available information":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance. Even with additional guidance, this may be very challenging or impossible to fully track everything in an EHR.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Electronically exchanged structured elements present for a given decision/action":

- Is the scope of the structured elements intended to be limited to just the CCDS?

Comments on "Number of times a complete and current medical record was accessible to a patient and a provider during a clinical encounter":

- Will the view/display/transmit (VDT) ACI report be sufficient to satisfy this requirement?
- Need to define "complete and current".
- Need to define "accessible to a patient and a provider". Does this mean whether a provider was using an EHR and whether the patient had access for VDT? This is very vague.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of clicks and/or sign-ons a provider has to do when accessing available information":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance. Even with additional guidance, this may be very challenging or impossible to fully track everything in an EHR. It may be preferable to capture this information through a survey or a usability test.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Amount of provider time spent searching for information that could have been available electronically (e.g., allergies, immunizations)":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance. Even with additional guidance, this may be very challenging or impossible to measure for this in an EHR.
- It may be preferable to capture this information through a survey. Many of these proposed measures will need general responses from provider interviews -not things EHR technology can always measure.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often information accessed by a provider was out of date":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance.
- Need to define the specific intent of "out of date".
- It is not clear how this would be captured. The provider would have to determine this. Where would they document this? This is not the type of data that would be recorded in a patient's record or in an EHR.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often information was difficult to understand because of formatting":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance. Even with additional guidance, this may be very challenging or impossible to measure for this in an EHR.
- It may be preferable to capture this information through a survey. Many of these proposed measures will need general responses from provider interviews -not things EHR technology can always measure.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often information was difficult to understand for other reasons (reasons should be defined)":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance. Even with additional guidance, this may be very challenging or impossible to measure for this in an EHR.
- It may be preferable to capture this information through a survey. Many of these proposed measures will need general responses from provider interviews -not things EHR technology can always measure.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Data could not be parsed or interpreted by a receiving system":

- Need to clarify. Does this measure look for NACK response stacks for InfoButton calls, CDS MOM/alert failures or timeouts, DUR failures, something else?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Data could not be used by the provider or members of the care team in the provision of care":

- This is very subjective and thus difficult (potentially impossible) to consistently identify/specify what to measure without additional guidance.
  - Would error logs help and/or be a better mechanism to provide the requested information?
- Who determines what can and cannot be used and where would this be captured? This is not the type of data that would be captured in a clinical EHR by clinicians. This would add an onerous step to the workflow of the clinicians.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of medication discrepancies among different medication lists (i.e., pre-admission list, home medication list, etc.)":

- Will medication reconciliation reports meet this measure?
  - If this is possible, will existing med rec report be sufficient, or will additional capabilities be needed?
  - If additional capabilities are needed, they will need to be clearly provided.
- The concept of "medication discrepancies" would have to be defined. The whole reason for reconciliation is to get to an accurate list. There are many reasons why there could be discrepancies - change in med by another provider, patient provided incorrect information, etc.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Percentage and frequency of quality metrics generated with electronically exchanged discrete data":

- Need to clarify the environment in which this is to be measured (e.g., internal QA test results or on field production performance test results)
  - if field performance test result, what is the scope of the discrete data exchange that is considered?
- To support this measure, the EHR would need to track how the data element entered the EHR and the quality metric would need to track that too so this proposed measure could make a determination. This would be very complex and extensive development.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess

interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Frequency of electronically exchanged discrete data used in a clinical decision":

- This is very subjective, and could prove to be very difficult to track/trace.
  - A distinction would need to be able to be made as to what data in the exchanged data is new data that wasn't already in the EHR. Then the data would have to be identified as being used in the clinical decision action.
- Will existing ACI/ACI Transition items that included medication reconciliation reports and/or PAMI reconciliation reports to aid in clinical decision making support this need?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Frequency of reconciliation/ incorporation of electronically exchanged information":

- Will medication reconciliation reports and/or PAMI reconciliation reports meet this measure?
  - If this is possible, will existing reports be sufficient, or will additional capabilities be needed?
  - If additional capabilities are needed, they will need to be clearly provided.
- How the counting would be done would have to be defined very clearly. For example, there could be a medication from the C-CDA that populates into the medication list to be acted upon. The patient may tell the provider they are no longer taking that medication. How would that be intended to be counted?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of closed loop referrals to providers":

- Will existing measure (CMS-50) be sufficient to cover this? If not, will need to clarify what else is needed to differentiate this.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Presence of duplicate labs/imaging":

- While this likely could be relatively easy to measure on data in the EHR, it will not be so easy to measure (with the data on the EHR side) with the XML data in C-CDAs

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often patient's experience includes increased electronic access to their health information and electronic tools, which increases the frequency that they review and follows their clinical care team's instructions for treatment or care":

- Needs clarification of what constitutes "increased". Does this mean the frequency of patient logins?
- This is further complicated by the need to measure increases in patients following instructions, which would ultimately require feedback from patients.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often patient's experience includes increased electronic access to their health information and electronic tools, which increases the frequency they set and track their individual health goals":

- Needs clarification of what constitutes "increased". Does this mean the frequency of patient logins?
- There is currently no requirement for functionality that permits patients to set and track their individual health goals.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Impact of patients' use of their health information (e.g., shared decision making, medication adherence, patient activation, change of health behaviors)":

- This would not be measurable as a discrete data element in the EHR unless documented as such by provider.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of care plans that include the patient's personal health goals, personal health concerns, and family caregivers":

- This could be measurable where care plans and data elements are established and required.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of duplicated/reduction of labs and imaging over time on provider and payer side":

- Would need to clarify how to measure on both the EHR and the payer side. The payer side would also need to clarify how/if this can be measured without payer-identified gaps in care.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who

will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of Adverse Drug Events with newly prescribed drugs where offending other drug not in prescriber's EHR":

- Need more information on the intent and what would be compared to determine this.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of instances a medication was not given for patient who came from outside healthcare facility":

- It would be a challenge to know for certain which medications were supposed to be given. This would require a clinician's judgement.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Patient/caregiver satisfaction with provider care due to provider having personal electronic health information from another provider":

- This would not be measurable as a discrete data element in the EHR unless documented as such by the patient in the portal with associated population of the EHR or by an EHR user.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Patient/caregiver satisfaction with the transfer of personal electronic health information from provider to provider":

- This would not be measurable as a discrete data element in the EHR unless documented as such by the patient in the portal with associated population of the EHR or by an EHR user.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of times that a look-up is done for prior outside imaging studies, lab orders, or medications, before ordering a new imaging study, labor order, or prescription": Need to clarify what would constitute a "look-up". For example, does this mean looking this up in the XML of C-CDAs received within a certain time range? How would that time range be set? It would likely be variable by test/order/medication type.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess

interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments for "Were the clinical staff trained on accessing data"

1) While this looks like a YES/NO attestation scoring method, confirmation is needed.

2) What is the extent of training assessed here. Is it EHR training? Note that this appears to be an organizational measure, not specific to functionality within an EHR. The training information for clinical staff would not reside in an EHR. The EHR would only have clinical data related to individual patient care.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Relevant clinical and nonclinical care providers who could electronically view, download, and transmit health information from their own site":

- The focus/intent of this item is unclear. It sounds like this is about whether staff can view/display/transmit (VDT) health information for themselves. There is currently no requirement for a care provider to VDT health information from the EHR. All that functionality exists. The only one that has an MU counting touchpoint is Send. There is no MU requirement to View. The 2015 Edition Data Export functionality could be used to Download, but that is not currently required functionality for clients to use.
- This needs clarification, sounds like they are referring to patient proxies. And "from their own site" makes is sound like they already have access through some other means.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Type of health information exchanged per month per patient and to what stakeholder"

- Needs clarification. There are many ways that information about a patient can be exchanged. There would need to be specifics about whether this is C-CDAs only and if exchanged with providers or with the actual patient, interfaced data and CDAs provided for registries, and data sent to HIEs.
- The more variables there are, the harder it will be to do accurate counting.
- The output of this would also be challenging. It is probably not horrible to calculate an average of data per patient per month if the numerator is explicitly clear and countable. However, keeping track of summarized information on stakeholders who were sent data would be extremely challenging

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Available structured elements that were electronically exchanged per patient":

- Can this be restricted to CCDS as CMS programs specifically mandate CCDS?
- The reporting on this type level of detail is possible, but takes a long time for reports to run as they need to parse through all the XML content looking

for whether the data is there or not. First you would have to know the qualified data elements, then you would have to assess every method of interoperability (C-CDA exchange, interfaces, registry transmissions, etc.) to see if any of the qualified data elements were included any of those exchanges. This needs a lot of clarification.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Data elements that were captured electronically but not exchanged between at least two entities":

- this requirement is too generic -are we only looking at sensitive data?
- Measuring an event that did not occur would be very challenging. First you would have to know the qualified data elements, then you would have to assess every method of interoperability (C-CDA exchange, interfaces, registry transmissions, etc.) to see if any of the qualified data elements were included any of those exchanges. This needs a lot of clarification.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number and type of users participating in exchange by role (i.e., doctors, nurses, care coordinators, etc.)":

- Does this apply to EHR measure or is this more for HIE to measure their performance? In general, this appears to be an industry level assessment and further guidance is needed related to where this would be measured.
- For our EHR, clients typically use generic hospital or clinic level Direct addresses with an automated process. This would make it very difficult to tie the sending to a particular role for counting purposes, and even attempting to tie DIRECT messaging (or any system-system messaging) to roles might be counterproductive.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number of EHR systems generating Continuity of Care Documents (CCD) or Continuity of Care Record (CCR) to exchange":

- Does this apply to EHR measure or is this more for HIE to measure their performance? In general, this appears to be an industry level assessment and further guidance is needed related to where this would be measured.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Picture Archiving and Communication Systems (PACS) images that were sent or accessible between electronic health record systems.":

- incorporate imaging results was a toped out measure from MU, why is this being proposed to be measured again?
- This is a hard one to count from the EHR. Most inpatient EHR clients have this available via a tab integrated into the EHR. That means the viewing of the data and the discrete data that would need to be counted is not readily available.
- It is possible to configure this in a way that would provide that. However, in practice, this provides the provider access only to images where the radiologist has completed the reading. In the hospital, providers often need to view the images as soon as they are available. That is where the tab integration comes into play.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Amount of health data exchange done through APIs conforming to nationally certified standards through the HHS":

- What is exactly intended to be measured here?
  - "Amount" needs clarification… megabytes? CCDS data components? Codified data elements? Transactions per month?
  - Would counting be based upon patients accessing their data, providers accessing the data, or both?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often patient's experience includes increased electronic access to their health information as well as electronic tools to improve health behaviors.":

- Is this measure trying to compare a CAHPS kind of survey response before and after a point in time and comparing VDT actions in portal?
- The term "electronic tools" needs to be defined as it is too vague.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "How often patient's experience includes increased electronic access to their health information, which increases their participation in shared decision making with the clinical care team":

- Is this measure trying to compare a CAHPS kind of survey response before and after a point in time and comparing VDT actions in portal?
- Needs clarification of what constitutes "increased". Does this mean the frequency of patient logins? That should be fairly easy to measure.
- Needs clarification of what is being measured as 'access.' Does this mean the patient takes an action that can be measured? How would shared-decision making be measured? Would clinicians be documenting that this took place?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Number and type of users actively exchanging electronic information":

- What type of information is this intended to capture? (e.g., electronic prescriptions between provider and pharmacy? CCDAs between providers? Data from EHR to PM system?)
- For our EHR, clients typically use generic hospital or clinic level Direct addresses with an automated process. This would make it very difficult to tie the sending to a particular type of user (role) for counting purposes, and even attempting to tie DIRECT messaging (or any system-system messaging) to roles might be counterproductive.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Percentage of available, electronically exchanged data elements that were valid and related directly to the patient":

- Is this related to CCDA?
  - If yes, any document that is shared is related to patient - what is the use case here for non-patient data?
- Is the intent to measure percentage of available, as opposed to unavailable? Or percentage of valid as opposed to invalid, as they relate to the patient? Are there really data elements exchanged that are not related to the patient? Is that what they are seeking? This needs clarification.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Available, electronically exchanged data elements received from the sender that were related directly to the patient":

- Is this related to CCDA?
  - If yes, any document that is shared is related to patient - what is the use case here for non-patient data?
- How would this be measured? It seems like the recipient would have to grade the data in terms of relation to the patient, which would be an onerous workflow. Otherwise there would need to be some valid way to measure this.
- This really seems to be about quality of data - Quality can't be measured by a report calculation. it takes a human to review and determine the quality of the data.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

Comments on "Percentage of applicable standards recommended by the US Department of Health and Human Services (DHHS) that are implemented":

- Measures are driven by ONC Health IT certification program that defines the certified status - how is this different?
  - It seems odd that clients who are using ONC certified EHRs would have to say whether they are complying with the standards that are built into their EHR. Why wouldn't use of a certified EHR technology suffice for this?
- Seems like this may be more of an organizational attestation. They would need to know the entire list of applicable standards and which one(s) each

component of the organizations interoperability infrastructure uses. Needs a lot of clarification.

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

Allscripts

2) Too few measures supporting greater social capabilities

Another area which the framework lacks to mention is the social capabilities within an organization. The measures should also have the goal of increasing the end-user's ability to influence and negotiate exchange, which will benefit the patient. There are many gains from ensuring this capability, such as end-user empowerment, and reconciliation of and the quality measures do not provide enough of a path allow electronic collaboration on such negotiated exchange. The major premise appears to be that interoperability can be achieved without increasing the social capabilities of end-users.

Example.

Reduction of provider identified errors in the patient's medical record - This measure seems to discourage the correction of data in the patient's chart, and the mechanism by which people should reduce the errors in the first place is not specified. They could follow-up on error data in the chart to determine root cause. Is the source of the data the sender? If so, it seems more logical to measure whether the errors had follow-up action and this would be better if the end-users or administrators had a mechanism by which to question and communicate about data.

>Committee Response:

Thank you for your comments. We have reworked the graphic in the framework to have the patient at the center to illustrate the end-user's ability to negotiate exchange through multiple systems, and we include consumer choice as a new measure concept.

Allscripts

1) Document Assumptions for improved Shared Understanding

Each measure should be traceable to documented researched assumptions on how the measure would lead to better outcomes and costs savings. These traceable links are not explicit as a guiding principle in the framework, and reduce the ability for those who are reviewing to understand the full impact of the measurable concepts. To expand on this, a primary goal should be to not dilute behavior which supports patient care. Which include not diluting current behaviors or methods which are assets to patient care. This should be done for all. However, I've listed the measure concepts which seem to most need definition of assumptions upon which they are based. I think the implied connection between each measure and its ability to help achieve reduce costs or better patient care should be explicit in the report to generate the shared understanding of how that works to provide a mechanism to evaluate the success of any measure and its continued use.

Examples.

Number of instances a medication was not given for patient who came from outside healthcare facility – It is not clear why instances of medication not given to a patient from outside healthcare facilities improves patient's care.

Amount of health data exchange done through application programming interfaces (APIs) confirming to nationally certified standards through the Department of Health and Human services – This seems like a way to analyze the ROI of building APIs and to encourage organizations to work with parties which can integrate to an Electronic Medical record using APIs. That underlying logic (if correct) could be made available.

>Committee Response:

The measure concepts listed in Appendix A do not represent completed measures, bur rather ideas for a measure with a planned target and population. As the concepts are built into actual measures, they will have to demonstrate how they will impact healthcare quality outcomes and processes.

Allscripts

4) Patient Privacy Concerns

This concern should be listed as a relevant aspect of interoperability needs. It is mentioned under "authorized use" in the executive summary, but it is not integrated into the framework. I think that privacy concerns can pose a barrier to health exchange and the rights of patient's is not part of this framework. There is education on training clinical staff, but no mention of educating patients.

Example.

Data elements that were captured electronically but not exchanged between at least two recipients – This should exclude data which the patient declined to share or else somehow deal with that scenario.

>Committee Response:

We have added patient privacy and confidentiality as measure topics under the subdomain "Availability of Electronic Health Information." We have added security and trust framework as measure topics under the subdomain, "Method of Exchange."

American Academy of Neurology

The American Academy of Neurology (AAN), an association of more than 28,000 neurologists and neuroscience professionals, appreciates the opportunity to comment on the 2016-2017 Report on Interoperability. The AAN is grateful of NQF's efforts to prioritize and advance this issue. The measure framework and concepts have been well researched and thought out. However, this report seems premature given that electronic health records lack the ability to interoperate. It seems unjust to measure a practitioner, practice, or health system on their ability to transfer and receive information when that technology is not readily available for most. EHR technology vendors should be heavily encouraged by NQF to make interoperability an easy reality for everyone. Until that time it will be unfair to implement these measures for any reporting purpose.

The AAN would like to thank you for the opportunity to review this report and provide comments.

>Committee Response:

The Interoperability Measure Framework was designed to present a series of high-level measure concepts that can be developed into numerous measures as interoperability becomes more mature and frequent throughout healthcare.

American College of Surgeons

The American College of Surgeons (ACS) views the healthcare environment through three lenses: clinical care models, digital health information that connects clinical care models, and payment models which support the both digital and clinical care models. We believe the care models cannot succeed without a digital health information model which flows horizontally with the patient across the care delivery systems by way of semantic (machine usable) interoperability. We consider the optimal interoperable solutions to be best characterized by understanding use cases which can be divided into four general interoperability use case categories:

1. EHR – EHR

2. EHR – mobile device – EHR

3. EHR – mobile device – EHR – registries/clouds with Clinical Decision Support guidelines

4. EHR – mobile device – EHR – registries/clouds with machine learning / artificial intelligence

A similar framework is described in the draft report, however, we encourage the NQF Interoperability Committee to consider a more progressive view on the possible impact of interoperability. We would argue that interoperability at a certain level will allow for the development of new clinical decision support guidelines as well as artificial intelligence or machine learning at the point of care.

The ACS also encourages the Committee to consider convening stakeholders to identify their top use cases with a given specialty or group. Stakeholders could select specific domains to create interoperable solutions with an explanation of how to demonstrate whether interoperability is meeting the use case requirements from their perspective. With stakeholder-specific use case information, NQF could pilot use cases across relevant settings and across a diverse group of patients. In surgery use cases could be piloted for different surgical patient populations across diverse surgical environments. This could include measurement of bidirectional interoperability between primary care physicians – surgeons,

the emergency department – surgeons, as well as longitudinal and horizontal interoperability of imaging, labs, and devices. Other examples include interoperating patient demographics, interoperating cardiac disease standards or cancer standards. Each of these domains requires technical (syntax), semantic (machine usable), and process (human usable) interoperability.

If we achieve these goals, ONC could create certification standards that would greatly aid in data liquidity, which would eliminate data blocking, and enable patient cloud environments. This environment would reduce the lifecycle and current fiscal burden of managing one-off interoperable solutions after EHR products are sold to providers, which would create a grand scheme of interoperability.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

American College of Surgeons

To enable digital health information interoperability across EHRs, mobile devices, registries and patient clouds, the American College of Surgeons (ACS) strongly supports efforts such as the work by the NQF to help implement interoperability by way of developing national measurement of exchange, usability, application and impact of interoperability. We see the work NQF outlines as a key piece in ONCs plan for interoperability. It is important to note that critical to this work is that ONC, NIH or AHRQ assume a leadership and convening role for interoperability. This should include establishing a framework, processes, working with experts such as NQF to develop metrics to measure interoperability, overall governance, priorities, policies, logic models, standards, terminologies, value sets as well as overall support for resources needed to convene clinical content and context expertise alongside technology, and standards expertise.

>Committee Response:

Thank you for your comments.

American College of Surgeons

The draft report divides the Exchange of Electronic Health Information domain into three sub-domains: Availability of Electronic Health Information, Quality of Data Content, and Method of Exchange. The American College of Surgeons (ACS) asserts that exchange of health information would be more efficiently and thoroughly assessed by developing a mock system, which can plugged into a given data source such as an EHR to check system compliance. This would create an instant report on the availability, quality and method of exchange. This would also be able to measure comprehensibility, relevance, and computability which fall under the Usability and Application domains outlined by the Committee.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

American Medical Association

- The AMA supports the use of the 21st Century Cures definition of interoperability and emphasizes that data exchange and use should not require special effort by the user. This is an important component of interoperability and bears repeating. Currently, data exchange, use, and measurement are largely seen as burdensome for physicians. This has been driven by CMS' Meaningful Use (MU) Program objectives and corresponding numerator/denominator measures. Unfortunately, sharing data is now largely a process to "track" interoperability. As NQF and others contemplate a measurement framework for interoperability, special attention must be paid to data capture, exchange, and use and the impact these have on clinicians. We urge NQF to consider methods that promote the value of data and methods to ensure accuracy, reliability, and validity without further burdening physicians.
- While NQF does not define 'data blocking' in its draft report, the term is referenced in the interoperability definition. Specifically, NQF cited a March, 2017 study in which half the respondents reported that EHR vendors routinely engaged in information blocking. Among EHR vendors, the most common form of information blocking was

deploying products with limited interoperability. Consistent with our concerns mentioned above, the sharing and use of data has become a hurdle, due in part by EHR vendors developing products that block the flow and use of data—requiring excessive effort on the part of physicians to send, receive, find and use patient information. We believe NQF has not sufficiently taken EHR vendor business practices and product performance into account in their Measurement Framework.

>Committee Response:

The definition of Interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

Data blocking was discussed extensively by the Committee. While data blocking is out of scope of the project, the report could benefit from a clearer definition and explanation of the role data blocking plays in interoperability. Additional language will be added to the report.

American Medical Association

NQF notes that 'true interoperability' is a significant challenge to healthcare organizations. While the AMA agrees with NQF's reasons, including the need to reconcile the differences in data meaning and structure, incompatible products and technologies, and barriers like data blocking, we are concerned the draft report inaccurately assumes ONC's EHR certification process has created a foundation for interoperability. Rather, certification is explicitly designed to test a products' ability to conform to criteria associated with federal reporting requirements (e.g. MU). There are numerous issues with this paradigm—including EHRs being built for reporting needs rather than for physicians and patient care and ONC's overreliance of testing in a laboratory environment. We are concerned NQF may inadvertently perpetuate the assumption that federal EHR testing is aligned with the definition of interoperability.

NQF states that an environmental scan helped inform the foundational measurement framework and will provide insight in the development of new measures that objectively assess interoperability. The AMA agrees that a component to true interoperability measurement must include an objective approach. Objective measures lend themselves to consistency, repeatability, and comparability and, if developed and applied appropriately, support noninvasive methods of tracking conformance to standards. As previously stated, EHR development has lacked the appropriate focus on interoperability for patient care. Pivoting away from this will require not only a reevaluation of design priorities, but also measuring an EHR's ability to conform to these priorities. Therefore, we are concerned NQF's Measure Framework does little to acknowledge EHR testing and conformance.

NQF notes that interviews supplemented the environmental scan and lists eight organization types—payers, health information exchanges, integrated delivery systems, health information exchange vendors, EHR/HIE vendors, informatics, and patient advocacy groups. While we believe integrated delivery systems may have included the physician perspective, we are concerned NQF is lacking the voice of front-line physicians working in small/solo medical practices. It is clear from speaking with our members that health IT systems differ drastically in these environments. Furthermore, many integrated delivery systems, by their very nature, must develop in-house or "bolt-on" software services to enhance their EHR's interoperability. To gain an accurate perspective of interoperability issues faced by all physicians, NQF should engage with a range of practice sizes and medical specialties prior to the release of the final draft.

>Committee Response:

The Interoperability Measure Framework was designed to present a series of high-level measure concepts that can be developed into numerous measures as interoperability becomes more mature and frequent throughout healthcare. It was not designed to be a part of ONC's certification process nor was the scope of the project intended to include testing and conformation. As measures are

developed that assess interoperability and its impact on healthcare process and outcomes, it may then be viable to ascertain the capabilities of EHR systems to collect and report that data. A number of physicians were part of our Committee and several were interviewed as key informants.

American Medical Association

The AMA agrees that nonclinical data (e.g. social determinants of health) are important elements in completing the full picture of a patient's health and wellness. NQF correctly highlights that these data reside across multiple systems and pose a significant challenge for EHRs and other clinical information systems to manage. The AMA stresses that data vocabulary, terminology, and standardization work must be managed by physician-led organizations. We value the need for expediency, however, we caution that work in this area must not be rushed or diluted in order to solely accommodate a particular measurement framework. NQF should consider the work being done by organizations such as Health Services Platform Consortium (HSPC) and the Physician Consortium for Performance Improvement (PCPI) in the Measure Framework final draft.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

American Medical Association

The concepts provided for each of the domains and subdomains are very narrow and just provide a slice of the entire picture. Ultimately, physicians and patients want to know that data was exchanged and available at the point of care when needed and ultimately that patients outcomes are improved and/or the reliability and validity of the data and performance scores improve due to access to data.

>Committee Response:

The Committee decided that the concepts presented under each of the domains/subdomains were broad enough to develop a number of measures that will assess interoperability and its impact on healthcare quality and processes. Language within the guiding principles was slightly altered to highlight that the patient is at the center of interoperability and how it affects them.

American Medical Association

With the inclusion of view, download, and transmit, (V/D/T) the AMA is concerned NQF is too closely aligning the 'availability of electronic health information' subdomain with CMS' antiquated MU/ Advancing Care Information (ACI) objectives. While the ability to view, download, and transmit information are important aspects to information exchange, the current implementation of V/D/T is very limited. This is due, in large part, to the prescriptive requirements placed on EHR development by CMS and ONC. Basing any measure development on the current iteration of these concepts is shortsighted and could inadvertently perpetuate interoperability issues. The AMA is encouraged that recent legislation (i.e. MACRA and 21st Century Cures) will allow a fresh look at health IT development; however, it will take at least another development cycle to incorporate improvements in EHRs. That being said, NQF has elected to explicitly list current MU/ACI measures as short-term concepts and examples of existing measures (Appendix A and B). The AMA recommends that NQF should exclude all current MU/ACI measures from consideration for measure development.

Data validity and accountability are important aspects in data quality. The AMA agrees this is an appropriate subdomain to consider for interoperability measurement. We, however, caution that NQF should first consider what, if any, methods are being used to track these aspects. The AMA is not aware of an established consensus on the type of metadata needed to ensure data quality. While health information exchanges (HIE), integrated health systems, health IT vendors, and clinical registries may utilize unique data quality approaches, industry-wide interoperability measurement at this level would require a broad agreement by a wide-range of stakeholders. We recommend that NQF seek input from organizations that have conducted work in this area and consider incorporating their work in the Measurement Framework final draft.

>Committee Response:

The Committee opted to not include any MU/ACI measures not currently included in the framework as representative examples of the measure concepts. Several of the key informant and Committee members have decades of experience in interoperability and provided guidance on concepts around data availability and accountability.

American Medical Association

Understanding the volume and format of electronic health data are important precursors to measuring nationwide interoperability. Together, these aspects help measure conformance to data standards. Understanding the number of transactions and level of conformance to a standard highlights an EHR's ability to syntactically interoperate with other systems—or communicate using specified data formats and structure. As previously mentioned, the AMA supports objective approaches to measuring interoperability. Standards conformance can be demonstrated through objective testing and therefore should be considered as a core measurement concept. NQF should emphasize that work in this area should be prioritized.

>Committee Response:

Use of recommended messaging standards and clinical vocabularies are included as measure concepts.

American Medical Association

For physicians, the usability of health information plays a critical role in the overall value of EHRs. The AMA recommends combining the relevance and comprehensibility subdomains with the human use and computability subdomains of 'Application of Exchanged Electronic Health Information'. All four are components of data usability and all underpin semantic interoperability—or the ability of a system to exchange data with unambiguous, shared meaning. The AMA agrees that data usability is a major factor in true interoperability; however in terms of objectively measuring interoperability not every aspect is appropriate to measure at this time. While aspects like timeliness, completeness, and to some extent data analytics can be quantified, others such as interpretation and presentation are unique to the clinician and would be challenging to incorporate in an interoperability measurement framework. The AMA recommends that NQF reconsider measures and measure domains that do not lend themselves to objectively assessing interoperability. Rather, NQF should closely monitor ongoing work in fields such as human-factors engineering and reevaluate measure domains for future framework drafts.

>Committee Response:

The usability domain referred to information that focuses on the ability of the stakeholder to acquire and use the data when and where needed. The Committee opted to divide the domain into three subdomains for the final framework: relevance, comprehensibility and accessibility.

American Medical Association

See comments on 'Usability of Exchanged Electronic Health Information'.

>Committee Response:

The usability domain referred to information that focuses on the ability of the stakeholder to acquire and use the data when and where needed. The Committee opted to divide the domain into three subdomains for the final framework: relevance, comprehensibility and accessibility.

American Medical Association

Measuring the effect interoperability has on the healthcare system is important in understanding the role data exchange plays in ensuring patient goals are being achieved, care is being delivered efficiently, and health outcomes are positively impacted. The AMA also agrees measuring the impact of interoperability will require measures in other domains. The health IT industry must have a mature measurement construct to validate both semantic and syntactic interoperability within and between health IT systems. As outlined in our comments, there are a number of areas NQF should reevaluate prior to assessing at the 'impact' level of interoperability. Appropriately measuring interoperability's impact in healthcare is deeply dependent on resolving core issues. These include reorienting health IT development and testing conformance to standards.

NQF should first focus on methods that demonstrate interoperability at these levels.

Furthermore, the AMA does not believe NQF has taken use cases, and their association with each domain and subdomain, into sufficient consideration in the draft report. Addressing interoperability problems by prioritizing specific clinical or business needs —often referred to as a use case—reduces the complexity by breaking data sharing activities into manageable pieces. Instead of trying to solve every aspect of interoperability, use cases allow stakeholders to focus on priority areas that will bring the most benefit to physicians and patients. As a starting point, NQF should consider use cases outlined in ONC's Interoperability Roadmap.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

American Medical Association

We are concerned by a lack of differentiation between measures used for accountability purposes vs. quality improvement. There are a lot of concepts proposed in the report and only a few appear to rise to the level of importance for accountability uses. We request NQF clarify and address the issue and differentiate.

>Committee Response:

The scope of work for this project was to develop a framework of measure concepts related to assess interoperability and its impact on healthcare processes and outcomes.

American Medical Association

We are disappointed that the measures listed do not address the issue of exchange of data. The current concepts over emphasize process, such as the number of clicks or sign-ons a provider had to do when accessing information and the amount of time a provider had to spend searching for information, etc.

>Committee Response:

There is a domain within the framework entitled Exchange of Electronic Health Information that goes beyond simple processes.

American Medical Association

Many of the measures listed under the Impact Domain are a stretch since they may not be able to leverage exchange or the current intent/focus of the measure does not really require exchange of data nor is it intended to. For example, pg. 27 the measure concept "patient's experience includes increased electronic access to their health information and electronic tools, which increases the frequency they set and track their individual health goals" and the existing measure listed is "prevention management of obesity for adults: percentage of patients with a BMI greater or equal to 25 who received education and counseling for weight management strategies that include nutrition, physical activity, lifestyle changes, medication therapy, and/or surgical considerations." While the existing measure is important, the concept needs a new measure developed. The existing one is a different concept.

>Committee Response:

The Committee understands that the measures listed in Appendix B might not be entirely interoperability-sensitive, which is why they serve as representative examples of the measure concepts.

American Medical Association

The report needs further emphasis that the goal of interoperability should not just be to exchange data but to make sure that data can be exchanged when needed with little to no effort and that data is accurate, reliable and valid. As drafted the report touches on the issue, but it is not clearly articulated or highlighted as much as it should be within the report. The current state allows for the exchange of a lot of data but the issue it that we need to pivot to allow for data to be exchanged with little to no effort and work to ensure that it is reliable, consumable, and digestible at the right point in time. We are also disappointed that the report does not highlight and emphasize the necessity and importance of real world test.

We also disagree with the definition provided for an interoperability sensitive measure. The report states that it is "a quality-of-care metric designed for reporting from an EHR and capturing any potential effects of EHRs". To just state EHRs is too limited and conflicts with the first guiding principle in the report, which states that "Interoperability is more than EHR to EHR." As drafted, the definition assumes that only EHRs can report measures that would be deemed interoperability-sensitive. However, health information exchanges and registries and other technologies can report measures. We request NQF amend the definition and more broadly define to say interoperability-sensitive measures should leverage data from health information technologies.

We are disappointed that the report lacked emphasis on the value of use cases and their association with each domain and subdomain and that NQF refrained from utilizing uses cases as a major component of focus with the Framework. Use cases allow stakeholders to focus on priority areas that bring the most benefit to physicians and patients.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work. The report include four domains that cover a number of areas of interoperability that the Committee deemed important and a priority to develop measures that would assess interoperability and its impact on healthcare processes and outcomes. The definition of Interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

CentriHealth

As you know, there are many issues around data quality and "fitness for use", leading to uncertainty and mistrust of exchanged health data/records. This initiative really should not proceed without a determined effort to examine root cause(s) of our failure at interoperability and interoperation. I'm really concerned that this DRAFT Report is debating the hues of a new patina to disguise serious underlying problem(s) and that thus we're putting off the inevitable reckoning to another day.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

CentriHealth

Thank you for the opportunity to comment on the NQF DRAFT Report. We believe it is vital to focus on assessment of interoperability and interoperation. This is an often ignored topic that should ultimately serve to validate the billions of taxpayer $$$s expended to achieve the objective of EHR adoption and ubiquitous interoperability/interoperation of EHR/HIT systems and health data/records.

Interoperability does not just facilitate one way (single direction) exchange, but rather the ability for software interoperation – two or more ways – across two or more EHR/HIT systems.

Evaluating interoperability is much more than counting transaction volumes (quantitative assessment) but rather it's about attaining the maximum measure of success (full qualitative assessment). Ultimately, this means continuously and consistently yielding gold nuggets from an avalanche of often

irrelevant exchanged data fragments. The true "gold nuggets" in health data/records must (as the

result of interoperability):

- be readily accessed and discoverable,
- show provenance from their source,
- bear evidence of truth,
- be shown in full context without loss of meaning,
- be fully relevant (to the condition/task at hand), and
- be immediately actionable.

>Committee Response:

Thank you for your comments. We agree that interoperability is more than EHR to EHR and that is reflected in the guiding principles section of the framework. The scope of the framework was to develop measure concepts that assess

interoperability and its impact on healthcare processes and outcomes. Many of the topics you delineate in this comment are included in several of the proposed measure concepts.

CentriHealth

1. Interoperability and Interoperation

Interoperability is the term used yet interoperability in context of the NQF DRAFT Report seems to involve one-way transmission of health data/records (source --> receiver), as identified by the focus on exchange/use. EHR/HIT systems that are interoperable should in fact be capable of interoperation as a two-way engagement of software functionality.

From our perspective, it is precisely the focus on interoperability in the narrow context of point to point "exchange and use" that has caused/resulted in our current failure to achieve broad-based interoperability or in fact, interoperation of HIT/EHR systems. We address this further in comments following. The NQF Report must address both interoperability and interoperation beyond the single dimension of point to point exchange (one source to one receiver).

2. Essential Characteristics/Properties/Qualities of Interoperability/Interoperation

What are key characteristics, properties and qualities of health data/records that demonstrate (achievement of) interoperability to the end user? Consider what we we've learned from our experience with information integration and interoperability within the domain of a healthcare enterprise. Of course, the enterprise domain is typically well-bounded, diligently protected and carefully curated with tight coupling of EHR/HIT systems, devices and software. The described properties/qualities are to ensure:

• Evidence of truth (authenticity); as the

• Basis of trust (assurance);

• For all end use(s) and to all end user(s).

Each of the identified characteristics/properties/qualities of interoperable health data/records is vital and should stand as a key finding of the NQF Report.

3. Extending Properties/Qualifiers to Show Evidence of Interoperability/Interoperation

In our opinion, there is nothing more important for interoperability assessment than rigorous measurement of the key properties/qualities identified above, both in terms of full conveyance in the exchange artifact but also as manifest to the receiver/end user. We recommend supplementing the proposed assessments described in NQF DRAFT Report Appendix A (List of Measure Concepts) to add qualitative measures to the (mostly) quantitative measures currently described.

4. Basic Interoperability Assessment 1 – Comparison Across Point(s) of Exchange

One basic form of interoperability assessment follows the pattern of collect, share and use. The NQF Report will not be considered complete unless it clearly focuses on the pattern of collect, share and use, and therefore offers a plan for assessment by comparison of health data/records at the point of collection/origination to those ultimately intended for use, after being shared/exchanged.

5. Basic Interoperability Assessment 2 – Comparison after Round-trip Exchange

A second form of interoperability assessment is based on a simple round-trip exchange of health

data/records…

The NQF Report should also include the capability for interoperability assessment afforded by roundtrip exchange of health data/record.

>Committee Response:

As addressed within the guiding principles, the Committee states that interoperability is more than EHR to EHR and involves bi-directional exchange from multiple sources. The scope of the framework was to focus on the development of measure concepts to assess interoperability and its impact on healthcare processes and outcomes, not to focus on the key qualities or characteristics of interoperable systems. We included an additional concept around a trust framework in the final version of the report.

CentriHealth

6. Interoperability Assessment to Support "Fitness for Use" and Affirmative Trust Decision by

the End User

Regarding Comments 2-4 above, it occurs that these properties/qualities are the same as those that

demonstrate truth (traceable to the source of truth) and enable an affirmative trust decision by the end user. In other words, if these properties/qualities are evident the end user can readily determine whether the health data/records presented are in fact trustworthy and "fit for use" in terms of the intended purpose (whether primary or secondary use). Shouldn't interoperability assessment in fact be designed to ensure "fitness for use" and support the end user's affirmative trust decision?

This should be made explicit in the NQF Report.

NQF DRAFT Report, Introduction, Page 5, Paragraph 2: "The definition of interoperability with respect to health IT means health information technology that (1) enables secure exchange and use of electronic health information without special effort by the user; (2) allows for complete access, exchange, and use of all electronically accessible health information for authorized use…"

>Committee Response:

We have included a measure concept around a trust framework in the final report, but concepts of "fitness of use" are outside of the scope of this project.

CentriHealth

7. Interoperability Definition is Fundamental to Proper Interoperability Assessment

A key shortcoming of the NQF DRAFT Report is that it relies on a definition of interoperability usually attributed to IEEE. The IEEE definition started as "exchange/use" (in 1990), and was later updated to include "without user intervention" (in 2014). The IEEE definition was never scoped nor intended to describe interoperability of health data/records nor interoperation of EHR/HIT systems. A key deficiency of this definition is that it leaves out the vital source of truth (point of health data/record collection), to which everything downstream (or subsequent) – sending, receiving, finding, integrating, using – must be anchored.

If you don't take into account the full lifespan and lifecycle of health data/records (collect, share and use) you have no basis to assess/measure interoperability because you have no source of truth or starting/anchor point (point of collection) upon which to compare any manifestation of health data/records downstream, whether at the point of exchange or ultimately at each point of use. Further you have no way to determine if the health data/records you wish to exchange and/or use are valid in the first place.

The NQF Report, to offer more than a vanishing echo of the past, must encompass the full lifespan and lifecycle of health data/records, over time and across one or more exchange instances.

8. Interoperability Assessment Should Focus Far Beyond "Fire and Forget"

"For two systems to be interoperable…" OK, as far as it goes, but we really need to be talking about more than one-way exchange of health data/records. As described in previous comments, interoperability is really about the interoperation of two or more systems with two-way or multi-way exchange amongst them. We have to consider more than single dimensional, point to point exchange. This is another reason that our efforts to achieve interoperability (using this approach) are at best little more than traditional "fire and forget" anachronisms, struggling to get beyond 1970s-era serial asynchronous (often RS-232-based) exchange schemes.

9. Interoperability Assessment Requires a Vision of the Future

From the content of the NQF DRAFT Report, there is offered vanishingly little basis to believe that these convened "expert" stakeholders, however astute, collectively share a vision of the necessary future state of interoperability, indeed trusted interoperation, of multiple systems leveraging a common consistent set of health data/records.

10. Interoperability Assessment without an Actual Source of Truth?

Given that the NQF DRAFT Report fails to start at (or even consider) the source of truth – the point of health data/record collection/origination – it occurs that this Report offers little substance beyond a rehash of what is known (and well-proven) to have failed thus far (in our pursuit of interoperability/interoperation of EHR/HIT systems).

10. Interoperability Assessment without an Actual Source of Truth?

Given that the NQF DRAFT Report fails to start at (or even consider) the source of truth – the point of

health data/record collection/origination – it occurs that this Report offers little substance beyond a rehash of what is known (and well-proven) to have failed thus far (in our pursuit of interoperability/ interoperation of EHR/HIT systems).

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to. The focus of the report is not on the technical aspects of interoperability, nor the lifecycle of an EHR, but rather on the impact interoperability has on healthcare processes and outcomes.

CentriHealth

11. Purpose of Use is Paramount to Interoperability Assessment

Critical to defining interoperability and the assessment thereof is to consider the purpose(s) of use. Are health data/records being conveyed for primary use (i.e., clinical care, interventions and decision making) or are they for secondary use (i.e., most everything else)? The fundamental principle for primary use is that successful interoperability ensures that source health data/records are collected, (retained), shared and used without alteration of content, context, provenance or meaning. While it's convenient to assume that two systems are "able to exchange data in an agreed-upon format according to a standard and subsequently present that data in a way that a user can understand and use", there's absolutely no value in this assumption unless the fundamental principle for primary use is applied and can be demonstrated/validated in all cases. The NQF DRAFT Report offers no recognition of unique interoperability requirements to support primary use, such as: attestation/attribution, non-alteration of content, context, provenance, meaning. This distinction is critical to any proposal for interoperability assessment and must be included.

12. Interoperability Assessment and Content Transformation in the Course of Exchange

As described in previous comments, achievement of interoperability/interoperation must ensure fitness for use (purpose) at each ultimate point of health data/record access/use. The following table shows the challenging paradigm of data/record exchange between heterogeneous systems and the risk to fitness (for use/purpose) posed by data transformations. Double transformations often occur during the course of exchange when health data/ record content is transformed to/from exchange artifacts – once by the source/sending system and once again by the receiving system. Exchange artifacts include those required in US Meaningful Use and MACRA regulations, e.g., HL7 v2 messages, NCPDP messages, HL7 CDA/CCDA documents and now HL7 FHIR resources. To be complete, the NQF Report must consider data transformation in the course of exchange and the resulting "fitness for use" (or not) as a key metric for interoperability assessment. Primary and secondary use are distinct and will have different thresholds of acceptance/ acceptability.

13. Measuring Clinical Context, Chronology, Provenance, Consistency, Useful Classification and Comparability

Under Meaningful Use (2011, 2014 and 2015 Editions), we've well demonstrated that a health data/record exchange scheme of standards-based messages and documents across multiple disparate EHR/ HIT systems often achieves something far short of integration, interoperability or interoperation. The required exchange artifacts are routinely created as odd assemblages of fragmented, disjoint data sets/elements lacking clinical context, chronology, provenance, consistency, useful classification and comparability. (For example, observe the typical real-time mash-up of CCDA-based patient summaries from multiple disparate sources inbound to a EHR system, subject to review and interpretation by an (often-overwhelmed) clinical user.) Given the ONC Interoperability Roadmap and the assessment strategy outlined in the NQF DRAFT Report, there is scant evidence that these thriving points of failure will soon be overcome, but at least measurement is likely to shine intense light on current shortcomings of the MU – and now MACRA/MIPS – exchange artifacts and methods. The NQF should specifically focus on measuring clinical context, chronology, provenance, consistency, useful classification and comparability as key determinants

in interoperability assessment.

>Committee Response:

The framework was developed to provide measure concepts that could be used in different settings of care. It is up to the developer of the measure to determine if how the information within a electronic health record is being used before determining how the measure should be developed. Assessing the use of data and determining fitness for use is beyond the scope of this project, but may serve as content for future work in this area.

CentriHealth

14. Interoperability via Transformation and Fragmentation?

Substantial amounts of health data/record content are now collected (captured/originated) – at the point of service/point of care – and retained as source content in integrated provider EHR/HIT systems. This data is immediately available and seamlessly interoperable with a broad range of other information within that domain. The essential qualities of truth are established and the trust decision is most always affirmative. This is the case BEFORE exchange occurs. We then take that same information and rend it from its integrated and interoperable habitat – slicing, dicing, fragmenting and transforming source health data/record content into the form and format

required for the standards-based exchange artifact. Structured content becomes unstructured and vice-versa, data types are transformed, coded values are mapped (often incorrectly, or even if correctly, losing important context) into the classification conventions of various external code/value sets and vocabularies. Code and value set derived data is mapped one to many and many to one. Some source data attributes lack corresponding attributes in the exchange artifact and must be dropped. Some codes have no equivalent value and are not included. [See table at Appendix B.] In patient summary oriented exchange artifacts, data relationships are often sundered. For example,

clinical content, chronologies, correlations, trends and relationships between encounters, problems,

assessments, clinical decisions, diagnoses, orders,

medications, results, diagnostics, interventions,

observations, therapies and care plans are lost or become unrecognizable. And so far we've only described what happens on the source/sending side of exchange. On the receiving side, all of the above slicing, dicing, fragmentation and transformation occurs once again, as receiver health data/record are populated with content from the exchange artifacts. It is a simple fact that transformations to/from exchange artifacts often create (introduce) alterations, omissions and errors in health data/record content. Data items that were integrated and seamlessly interoperable in the source system are no longer so. Data once fit for primary (clinical) use may now

only be fit for secondary use (or maybe not). [See graphic at Appendix A.] As an industry we've also demonstrated that in practice, standards-based exchange artifacts mostly yield to the lowest common denominator benchmark. This has proven sufficient to support some very limited health data/record secondary uses but not primary use (clinical care, interventions and decision-making). Health data/record content fragmentation, transformation and loss of provenance and context are substantive barriers to interoperability and thus are crucial areas of focus to any serious attempt at interoperability assessment. To be complete, the NQF Report should make this explicit and include corresponding measurement in the proposed interoperability assessment approach.

15. Chain of Trust

Ultimately metrics must be built into certified EHR/HIT systems that collect, share and allow access/use of health data/records. Software can account for actions, whether initiated by a human user, rules engine or algorithm, following each progressive step in the chain of trust as health data/records are collected, then shared, then used. The Chain of Trust is shown as successive Events (3rd/4th columns) in health data/record management – starting at the point of origination (the "source of truth") – with AuditEvent (5th column) captured at each Event. With this metadata the Chain of Trust traces source health data/record content and its path to each ultimate end user/use. Data Provenance (DPROV) Events (6th column) capture related metadata at points when health data/record content is new or

updated. Primary Use requires original data/record content to be evident at each ultimate point of data/record access use (7th column) and is a paramount success factor to achieving health data/record interoperability. The Chain of Trust provides evidence to support the Trust Decision by each ultimate end user.

Chain of trust is essential to assessment of the success/achievement of interoperability. The NQF

Report should make this explicit. AuditEvent and Provenance are two HL7 Fast Health Interoperability Resources (FHIR), which are part of FHIR STU-3 (published in March 2017) and profiled together in the HL7 FHIR Record Lifecycle Event Implementation Guide, also part of FHIR STU-3. In addition, the work of the Data Provenance (DPROV) Initiative under the ONC Standards and Interoperability (S&I) Framework offers a detail progression following the collect/share/use pattern. See the one page DPROV System Event Matrix as an example of patient summary exchange and included as an attachment to this response.

>Committee Response:

This brings up a number of good points regarding the fragmentation of data within EHRs that hinder interoperability. This is not within the scope of the current project, but serves as potential useful content for future work in this area.

CentriHealth

Comments are on Appendix A.

>Committee Response:

The comments presented on this Appendix are helpful in guiding the direction of development. As a consensus-based entity and endorsement body of quality measures, NQF can offer specific guidance on measure development. The concept were designed around the domains and subdomains in the framework to assist in the assessment of interoperability and its impact on healthcare processes and outcomes.

Cerner

We appreciate the opportunity to provide feedback on NQF's draft report "Measurement Framework to Assess Nationwide Progress related to Interoperable Health Information Exchange to support the National Quality Strategy." Having appropriate measures on the extent to which data is accessible and what the impact is of data sharing is critical to make the significant decisions at a national level to establish and execute an interoperability roadmap to improve on data liquidity across providers, patients, payers, registries, research, and other stakeholders. Intuitively, and through our clients' increased adoption of interoperability and the value they receive from that adoption, we know there is substantial benefit to all stakeholders and are committed to continued improvement on necessary interoperability. The challenge is to understand where to collectively focus our attention to ensure sentinel use cases that could not be substantially improved upon through a common, industry-wide approach are recognized and pursued vigorously at a national level.

The proposed framework identifies the key dimensions (domains/sub-domains) that are relevant to measure to enable a comprehensive understanding of the value of interoperability. Volume metrics alone do not paint a full picture to determine whether data is worth exchanging, while impact measures alone do not provide insight into how widespread the capabilities are in play. For example, understanding that thousands of documents are currently being exchanged would seem to indicate we are doing well. However, a better understanding is necessary whether those documents are being used for computable analysis/decision support, and positively change the course of treatment. In that context, we believe the proposed framework provides a good starting point to promote definition of measures across all relevant dimensions to paint a larger picture.

>Committee Response:

Thank you for your comments.

Cerner

We must recognize that with the advent of APIs, data is not necessarily "exchanged" as in copied from one system to another all the time, but rather "accessed" by another Application "directly". We suggest to clarify these aspects in the Method of Exchange

sub-domain by describing these concepts further and perhaps even adjust the name to Method of Access/ Exchange as well. Clarifying this in the section on Interoperability Is More Than EHR to EHR would be helpful also.

>Committee Response:

We have included the suggested language in the final version.

Cerner

There is a large challenge to measure the usability or impact of interoperability, which is evident in various proposed measure concepts and sample measures (new or existing).

Where the sample measures are highly correlated to interoperability, the measures mostly reflect process measures that are not necessarily indicative of the impact of interoperability in terms of quality of care, improved outcomes, reduced cost, or process efficiencies. However, it is reasonable to start with that type of measures as long as they do not require additional documentation by the clinicians or other users, nor that it stops there and forego on the more challenging impact measures.

Various impact measures are not only dependent on interoperability but may depend on other factors. Understanding the relative impact of interoperability will be challenging and is best discovered through focused research initiatives rather than nationwide surveying, or data analysis of impact measures (e.g., those measurable through claims data) compared to exchange, volume metrics.

>Committee Response:

Thank you for your comments.

Cerner

There is a large challenge to measure the usability or impact of interoperability, which is evident in various proposed measure concepts and sample measures (new or existing).

Usability is typically not that directly tied to interoperability as data from various internal and external sources are presented to a user. The ability to organize and navigate the data set presented to the user should be considered separately from the usability of data made available through interoperability. Relevance measures of external data addresses that more clearly, while Comprehensibility measures quickly go to the ability of the system to manage, organize, and navigate data sets regardless of source, thus not that indicative of interoperability.

>Committee Response:

Thank you for your comments.

Cerner

We appreciate the clarification that the sample measures presented in Appendix B may not be sufficiently susceptible to interoperability to be considered as actual markers for interoperability. We suggest that it may, therefore, be more beneficial to the reader to remove these measures considering the risk that these may be considered appropriate markers. For example, for the measure concept "Type of health information exchanged per month per patient and to what stakeholder" and the existing measure of "All-cause readmissions: the number of acute inpatient stays during the measurement year that were followed by an acute readmission for any diagnosis within 30 days and the predicted probability of an acute readmission, for patients 18 years of age and older", we believe that the measure is not sufficiently dependent on interoperability to clearly demonstrate the value of interoperability, thus would not be a workable marker for interoperability. Rather a measure that considers the number of transitions of care to long-term care facilities for which data was made available, compared to the number of re-admissions from those facilities, would more clearly address the value of interoperability and address the suggested measure concept. We suggest that further review of existing measures is required to improve the examples that measure developers can use to inspire their efforts.

>Committee Response:

There is concurrence that the measures listed in Appendix B may not be completely sensitive to interoperability, but they are to serve as representative examples of the measure concepts in order for a developer to gain an understanding of how to turn a concept into an actual measure that would be sensitive to interoperability.

DoD

Greetings. We have provided extensive edits/inputs to all sections of the report in a track changes version of the report which was emailed directly to the HHS/ONC. Please contact via email directly if you wish to receive the entire document containing proposed edits/inputs within the body of the document. We could not find a mechanism to upload the edits/inputs via this portal. The nature of the inputs/edits/comments regarding this report are summarized here under General comments. Even though the intent of this document is to encompass all aspects of medical and healthcare data interoperability, it is in reality, very EMR/EHR-centric regarding exchange of health records for conventional offline use for updating medical records in databases for business purposes. To meet the future needs of a rapidly transforming national healthcare system including next generation telehealth and predictive medical analytics, the focus will need to be on data capture from multiple and new types of medical devices and wearable sensors accurately and transforming that data from multiple sources in real-time into clinical information for more accurate diagnosis and treatment. So there are two levels of interoperability:1) intermediate data and technical interoperability requirements of formats, protocol interaction standards of automated medical devices and clinical computations and 2) end result health information interoperability for end users. This future is not EMR/EHR-centric but rather patient-centric by providing decision support at the patient point of care in real-time. Medical device interoperability is essential to that future capture and synthesis of data in real-time amongst multiple systems and devices for rapid decision-making (not only two-way conventional HIE type exchange). This document does not reflect that future. This document also emphasizes how to measure the impact of interoperability for conventional HIE. It does not address the even more essential question and specific strategies/approaches for how to achieve and measure true medical device and health information interoperability.

>Committee Response:

While medical devices/wearables are out of the scope of this project, the "Interoperability Is More Than EHR to EHR" section will be updated to include this attribute and the others listed above. Additional work around medical devices and interoperability should be considered.

FDA

Email from FDA and its comments:

"It is a significant element to acquire data from additional sources beyond the EHR, such as clinical trial databases, practice management systems, and third-party payer databases, and can produce analysis that is reproducible and reusable.

For the integration of EHRs with clinical research systems, recommend using the term: clinical research systems which will encompass Clinical Trial Management Systems (CTMS), Electronic Data Capture (EDC) and clinical data management systems (CDMS). "

>Committee Response:

While medical devices/wearables are out of the scope of this project, the "Interoperability Is More Than EHR to EHR" sections will be updated to include this attribute and the others listed above. Additional work around medical devices and interoperability should be considered.

Federation of American Hospitals

The Federation of American Hospitals (FAH) appreciates the opportunity to review and comment on the NQF draft report, "Measurement Framework to Assess Nationwide Progress Related to Interoperable Health Information Exchange to Support the National Quality Strategy." The FAH appreciates the Committee's work to scan the literature and develop the proposed framework and domains.

The FAH's comments include those that are specific to the language used in the report, as well as general comments on measure concepts and prioritization. The first specific language comment involves the discussion of MACRA and value-based purchasing under the "Providers" bullet on page 9. The language used here implies that the Medicare and CHIP Reauthorization Act (MACRA) began the shift to value-based care, when this shift began before the passage of this legislation. The second specific comment refers to the definition of

"interoperability-sensitive" measures found on page 15. Referring to these measures as "designed for reporting from an EHR and capturing any potential effects of EHRs" fails to include data found outside of EHRs and contradicts the first guiding principle in the report that "interoperability is more than EHR to EHR" (page 3). We recommend this definition be revised.

Regarding measure concepts and prioritization, before finalizing the report, the FAH encourages the Committee to re-evaluate the measure concepts. A number of the concepts and underlying measures are narrow in focus and look at structures and processes rather than looking at outcomes, and the FAH is concerned that some of the measures may not demonstrate the ability to leverage interoperability to improve outcomes. As such, these measures may be less meaningful to the providers and patients. Additionally, the FAH encourages the Committee in its final report to identify the highest-priority areas for measurement. Past experience indicates that a few targeted measures will focus attention on the most critical aspects of care delivery and lay a base for moving forward as interoperability matures.

Thank you for the opportunity to comment. The FAH looks forward to the continued work of the Committee.

>Committee Response:

We have modified the language regarding providers and MACRA as suggested, and have added a more detailed definition of "interoperability-sensitive" measures. The scope of this work was to examine the impact of interoperability on healthcare processes and outcomes, and the measure concepts represent a foundation to begin that work. The concepts are not actual measure themselves but rather an idea for a measure with a planned target and population. As these concepts are developed into measures, it is expected that they will be appropriately prioritized and include the necessary focus.

Hans Buitendijk

- Pages 3 and 5 - We should clarify the source of the interoperability definition as 21st Century Cures in-line rather than only through footnotes 1 and 3.
- Pages 3 and 5 - The statement, "Additionally, healthcare organizations maintain incompatible products and systems, which are unable to disclose the appropriate data within the organization and with partners in its community," implies that all healthcare organizations only have incompatible products and systems unable to disclose data within and across system. However, within healthcare organizations that is not often the case, while larger organizations have already changed substantially over the last two decades with the advent of health information exchanges. We suggest providing a more nuanced perspective to the state of interoperability.
- Pages 3 and 5 – The document states that ONC "developed standards for interoperability as part of its certified EHR technology, which provides national standards for interoperability, both in the exchange of information and in its use." While ONC initiated the development of some standards and implementation guides, e.g., Direct, most standards are included in the Interoperability Standards Advisory and Certification Edition by reference. It would be more appropriate to assert that ONC developed a set of standards as part of its certified EHR technology program, which identifies standards that must be supported to be certified to certain interoperability capabilities.
- Page 4 - The statement is made that, "The Committee determined the following domains and subdomains that most accurately measure interoperability and its impact on health outcomes." This seems to imply that the domains and subdomains perform the measurement where the following statement would seem more accurate: "The Committee determined the following domains and subdomains that reflect the areas that must be addressed to provide a comprehensive understanding of interoperability and its impact on health outcomes."
- Page 6 - It is unclear what we mean by, "Additionally, the development of domains and subdomains of the framework assisted in understanding current measures that are sensitive to interoperability that are potentially enhanced by adding data from sources outside of an electronic health record (EHR)." Categorization of measures does clarify whether the now categorized measure is more or less sensitive to interoperability. Understanding

sensitivity requires actual measurement and analysis. Rather, the paragraph on page 7 that starts with, "A measurement framework is a conceptual model for organizing ideas that are important…" seems sufficient. I would suggest to strike the statement on page 6.

- Page 7 – I believe that "i.e." in "(i.e., a lack of vocabulary…" should be replaced with "e.g."

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to. We changed the word from "developed" to "recommended". We made the additional edits as recommended.

Hans Buitendijk

- Page 10 – I am concerned that the statement, "… but rather the ability to obtain and exchange data electronically with those systems providing information necessary for the measures." puts too much emphasis on interoperability for the sake of measuring, which I don't think we intended in our discussions. The goal of interoperability is not to feed measures, per se, but rather to enable access to all relevant data for a patient. Clearly, interoperability can help improve on the quality and accuracy of certain measures as a more complete data set is being evaluated for that measure. However, those are two distinct purposes of interoperability where the primary focus of this framework, and this paragraph particularly, seems to be on measuring the impact/value of interoperability on patient care. I would suggest that the consideration of interoperability improving on the accuracy of measures is addressed separately as the domains/sub-domains currently do not address that aspect. Interestingly enough though, having more interoperability can cause the same data to be present in more data sets, thus cumulating quality measures across those sets would have to account for those overlaps. That would seem to be a different issue and out of scope.

>Committee Response:

The inclusion of this language was deemed by a majority of the Committee to demonstrate how to effectively develop measures from concepts that would be sensitive to interoperability.

Hans Buitendijk

- Page 16 - The following statement either has one word too many or is not complete. I highlighted the potentially extraneous word in bold/underscore. "These measures serve as additional examples of the measure concepts and are available in a spreadsheet online that captures the proposed measures, what area of interoperability they assess and evaluate, and how their overall usability."
- Page 16 – I'd suggest that the statement, "The Interoperability Measurement Framework represents a significant step in advancing interoperability within a diverse set of both healthcare settings and systems," is adjusted to, "The Interoperability Measurement Framework represents a significant step in measuring advancements in interoperability within a diverse set of both healthcare settings and systems."
- Page 16 – I'd suggest that the statement, "This framework provides an objective and independent assessment as to whether those objectives are reachable and what areas need improvement," is adjusted to, "This framework provides an objective and independent assessment as to whether those objectives are being reached and what areas need improvement."

>Committee Response:

We have made edits to this section as recommended by a number of commenters.

Health IT Now

Health IT Now (HITN) is pleased to submit our comments on the National Quality Forum Interoperability Draft Report. We believe an interoperable health IT network across locations, people, and devices is critical for health IT innovations.

To date, much emphasis has been placed on breaking through the lack of interoperability between disparate EHR systems, which, as you state in your report, is only one aspect of truly solving the problem of interoperability. However, much of your report remains EHR-centric instead of focusing on the

entire ecosystem of connected health devices. While EHR-to-EHR interoperability is essential, achieving this goal certainly does not deliver on the promise of health technology for patients and providers.

Government involvement in the quest to reach interoperability has mostly fallen flat and in some cases impeded progress. It is time to turn the tide and let the private sector lead the charge in identifying and developing standards being used widely in the marketplace in order to reach true interoperability. Interoperability will be reached once and for all with a bottom-up approach that starts with patient demand and leads to private sector answering that demand.

To realize the potential of technology and healthcare and to once and for all reach widespread interoperability, consider the following recommendations:

The framework is intensive on quantitative measures of specific use transactions. We believe that while the exchange of data is important, it may be more important to know when transactions fail and why. That information can be fed back to developers to improve either the authentication, authorization, security, communication, or interface protocols. Ensure regulations do not impede investment and innovation by overprescribing the types of data and focus more on the security and transport requirements for a health IT network.

We are also concerned that while well-intended, your efforts are duplicative of ONC efforts. On May 1, 2017, ONC released their Proposed Interoperability Standards Measurement Framework for public comment. Given that NQF received funding from the Department of Health and Human Services, it is concerning that both ONC and NQF have been working independently to develop interoperability measurement frameworks. NQF and ONC should clarify their roles in this process to avoid confusion moving forward.

We appreciate the opportunity to share our feedback and comments on the draft report. We look forward to continuing to work with NQF to promote the use of technology in healthcare to improve health outcomes and lower costs.

>Committee Response:

While medical devices/wearables are out of the scope of this project, the "Interoperability Is More Than EHR to EHR" sections will be updated to include this attribute and the others listed above. Additional work around medical devices and interoperability should be considered.

HealthCatalyst

In addition to the technical barriers to interoperability, there are contractual barriers that EHR vendors use to inhibit or outright prohibit the free exchange of data. Please keep that in mind as you build a framework. The framework should not be limited to overcoming the technological barriers. It should also include the contractual and intellectual property barriers.

In addition to leading product development at Health Catalyst, I've been a healthcare CIO at Intermountain, Northwestern, and the Cayman Islands; and I was an Air Force C3I officer. The DoD was a pioneer in interoperability and open systems. I've been around this topic for over 30 years.

>Committee Response:

Data blocking was discussed extensively by the Committee. While data blocking is out of scope of the project, the report could benefit from a clearer definition and explanation of the role data blocking plays in interoperability. Additional language will be added to the report.

Intel Corporation

Very interesting document. One of my ongoing concerns is the context where measurements are taken. Real world, I would say, is the most accurate setting. Whilst I didn't see an explicit reference to "real world", when browsing Appendixes A and B I understood that the large majority of the concepts have an implied "real world" context. Perhaps this is self-evident, but still I think it is a very important requisite. One could be tempted to push for "lab" proof of interoperability by invoking how difficult it is to measure things in the real world. I think we must resist those calls.

Another difficult point relates to "blocking". Perhaps the framework could ask point blank whether

blocking was experienced? My comment was more to say that whatever framework we use to assess HIT interoperability it should stress "real world" as context for its operation. Supposing that one wants to achieve actual/real/factual out of the box interoperability.

>Committee Response:

Data blocking was discussed extensively by the Committee. While data blocking is out of scope of the project, the report could benefit from a clearer definition and explanation of the role data blocking plays in interoperability. Additional language will be added to the report.

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

Kaiser Permanente

Interoperable health IT can contribute to improving health outcomes, quality of care, access to care, and better resource use. The adoption and use of interoperable systems have the potential to transform the relationships, expectations, and interactions among providers, consumers, payers, regulators, and other industry stakeholders.

We believe that innovative models of care delivery and payment will benefit from different models of health information technology and interoperability. Therefore, we strongly recommend defining interoperability in broader terms that go beyond merely measuring exchange transactions.

An appropriate focus for this framework should be identifying, achieving, and measuring the larger goals that interoperability is intended to serve – data-driven population health initiatives, better care transitions, ultimately more informed decision-making at the point of care delivery. We urge NQF to help strengthen and broaden the concept of interoperability and to define performance in terms of clinical outcomes and information availability rather than transactional processes and methods.

Recommendations

In general, we agree with the guiding principles NQF set forth for defining key criteria to consider when developing measure concepts and performance measures for interoperability. However, these principles emphasize information exchange, and largely ignore other feasible modes and approaches to interoperability, such as shared access.

We offer these specific recommendations:

Update the concept of interoperability to focus on achieving the objectives of interoperability, to reflect technology innovations, and to acknowledge the expectations and current practices of consumers, providers, and other stakeholders in the health information ecosystem.

The existing regulatory concept of interoperability is missing critical elements of shared access that can support interoperability without moving duplicate copies between siloed systems.

To serve patients, providers and others well, a concept of interoperability needs to be flexible enough to respond to changes in information technology, behaviors, and lifestyle, and the explosion in data volumes.

The concept of interoperability as a set of information exchange transactions (moving and duplicating copies of federally mandated data packages between siloed systems) does not take full advantage of the latest technology tools that support shared access and virtually integrated data.

To achieve interoperability, regulators must move beyond merely applying new technical methods to old transactional ideas, or simply counting bytes, transactions and documents moved between different settings. It is necessary to acknowledge how consumers live with data and technology completely differently than they did 10 to 15 years ago, when the transactions model was the norm.

(see General Comments, below…)

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

Kaiser Permanente

Recognize new paradigms when measuring interoperability. Measures of interoperability should focus on functional results, not technical methods.

The goal of interoperability is to make all the right information about the right person available to the right decision-maker at the appropriate time. In other words, create the ability to access or deliver more complete, comprehensive, person- centered, and usable data to improve health decision-making by clinicians and patients. Counting transactions that ship duplicate copies of data between silos is not the best measure of whether this goal is achieved.

Completeness, comprehensiveness, timeliness, appropriateness and usability of data sets can be measured objectively. NQF should focus on developing these measures in collaboration with ONC, NIST and other stakeholders.

A robust interoperability framework should consider the value of the latest technologies in being able enhance the ability to deliver accurate, comprehensive critical information at the point of care.

Incorporate shared access methods to achieve interoperability.

While we acknowledge the ongoing role and value of data exchange as a mechanism to achieve interoperability, there are multiple, rapidly evolving methods to achieve interoperability by shared access that are widely deployed today and outpacing older, traditional exchange methods.

With shared access, data need not be copied to achieve fully functioning interoperability. The person or system using the data shares access instead of storing a complete, duplicate copy of the data. Virtual compilations or sets of data from multiple sources may be processed together without first having duplicate copies stored in a single physical database.

Shared access methods may include mobile app access using standard and nonstandard application programming interfaces ("API"); authorizing individuals for shared application system access; or sharing system services (which may use standard APIs) to provide shared access.

Shared access methods apply equally to virtual sharing of data sets for qualified research purposes, or other authorized purposes, not only for real-time treatment purposes.

Continue supporting current mechanisms of information exchange, because duplication as a means of sharing data will not go away.

Moving duplicate copies of data extracts between siloed physical databases will remain a component of the health information ecosystem and sometimes can be a tool to support important patient safety functions.

Duplication may be necessary to support a provider's legally required record-keeping.

Some clinical business models, or locations, may continue to rely upon this older approach more broadly.

While shared access is growing rapidly, health information exchange, a prime example of data duplication, is also growing and should be maintained.

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

Lantana Consulting Group

Statement (pg. 3, paragraph 1): "The definition of interoperability with respect to health IT means health information technology that (1) enables secure exchange and use of electronic health information without special effort by the user; (2) allows for complete access, exchange, and use of all electronically accessible health information for authorized use; and (3) does not constitute information blocking."

Comment: Interoperability also supports aggregation of information from disparate systems in a single source.

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

Lantana Consulting Group

Statement (pg.3, bullet 4): "Interoperability needs will differ depending on the care setting"

Comment: This bullet seems redundant and vague compared to the earlier point that states, "Various stakeholders with diverse needs are involved in the exchange and use of data, and the use of this framework and measure concepts will differ based on stakeholder perspectives". The bullet is not a complete sentence closed with a period, but should be to align with the other list items.

Recommendation: Lantana suggests removing this bullet point or clarifying how this point differs from the preceding items. Lantana also suggests rewriting this bullet point to end with a period to align with the other items in the list.

>Committee Response:

We have removed the bullet per the suggested comment.

Lantana Consulting Group

Statement (pg. 5, paragraph 1): "Healthcare organizations depend on efficient and secure means for computer systems and applications to communicate and exchange clinical data to support better care management for patients, preventive care, and population health management."

Comment: Healthcare organizations depend on accurate and comprehensive data exchange to support safe management of care for patients. This statement will benefit from additional language for clarification.

Recommendation: Lantana recommends adding the words "accurate" and "comprehensive" to this section. The updated statement will read: "Healthcare organizations depend on accurate, comprehensive, efficient and secure means for computer systems and applications to communicate and exchange clinical data to support better care management for patients, preventive care, and population health management."

>Committee Response:

The edits have been made per the suggested comment.

Lantana Consulting Group

Consider mentioning the value of iterative interoperability development and incremental pilot testing as part of the progress towards NQF's goals.

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

Lantana Consulting Group

Sub Heading: Interoperability is more than EHR to EHR

Comment: Lantana believes interoperability exists within an "EHR" as well, especially when systems within a hospital need to share data as a single information unit.

>Committee Response:

We have slightly tweaked the principle to be inclusive of interoperable systems and how the patient is at the center of interoperability, per the Committee's request.

Lantana Consulting Group

Subheadings: Quality of Data Content

Comment: This measurement focuses on validation for sent, viewed, and downloaded data. Lantana suggests clarifying whether the scope includes criteria to identify gaps in the sent or downloaded content, and how NQF will assess and quantify missing data.

>Committee Response:

The scope does not include identifying gaps, but delineating measure concepts that assess whether the appropriate information is being exchanged.

Lantana Consulting Group

Recommendation: Lantana recommends evaluating the measures in Appendix A against the feasibility assessment criteria in the MMS Blueprint[1] and gathering additional details on data accuracy, data availability, standards use, and terminology.

[1] https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/Downloads/Blueprint-130.pdf, pg. 208.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Lantana Consulting Group

Subheadings: Relevance

Statement (pg. 13, paragraph 4): "This includes measures and/or measures concepts addressing timeliness, accessibility, and clinical completeness of the data."

Comment: This subdomain includes the measurement of "clinical completeness of the data". Consider adding details to the explanation or providing the planned criteria to determine whether "clinical completeness" exists.

>Committee Response:

Clinical completeness of the data is a measure topic. Measures that are developed under this topic may potentially include criteria to determine clinical completeness.

Lantana Consulting Group

ONC's Proposed Interoperability Standards Measurement Framework[1] contains two measurement types: implementation specification measures and use measures. Some of ONC's measurement areas coincide with the NQF domains and subdomains while others differ. For example, the NQF Domain "Exchange of Electronic Health Information" and subdomain "Method of Exchange, Quality of Data Exchange" coincides with the ONC measurement type "Implementation Specification Measures" and measurement area "Standard on Development plan". Lantana recommends combining the two interoperability measurement frameworks and creating a prioritized plan for execution.

[1] https://www.healthit.gov/sites/default/files/ONCProposedIOStandardsMeasFrameworkREV.pdf

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Lantana Consulting Group

Sub Heading: Stakeholder Involvement

Statement (pg. 10, bullet 4): "The ability of this stakeholder to catalyze interoperability can serve as a driver for improvement in healthcare quality and value – particularly in the efforts of prevention and health promotion – and can lead to cost savings for both public and private insurance programs."

Comment: Consider expanding this description to include the cost savings impact of public health surveillance with prevention and health promotion efforts.

Recommendation: Lantana recommends adding the term "public health surveillance" to this section. Lantana suggests that the updated statement reads: "This stakeholder catalyzing interoperability can drive improvement in healthcare quality and value – particularly in the efforts of prevention, health promotion, and public health surveillance – and can lead to cost savings for both public and private insurance programs."

>Committee Response:

We have made the suggested edit.

Lantana Consulting Group

Sub Heading: Differences Due to Settings

Comment: Consider emphasizing a core, common clinical data set for exchange at minimum. Lantana recognizes diverse settings have varying data needs.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Lantana Consulting Group

Sub Heading: Various Data Types

Comment: Consider mentioning the development of a core set of non-clinical data for exchange in non-clinical settings, such as jails, schools, and social services.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Mala Ramaiah

Introduction

The NIST health IT Usability initiative is focused on establishing a framework that defines and assesses health IT usability.

Usability definition

International standards bodies (ISO 9241-11) define usability as follows: Usability is the effectiveness, efficiency, and satisfaction with which the intended users can achieve their tasks in the intended context of product use.

We suggest that effectiveness, efficiency, and satisfaction be considered the subdomains and the measure concepts tailored to these subdomains of the usability of exchanged electronic health information.

According to ISO/IEC TR 25062, usability is measured by three types of metrics: effectiveness, efficiency, and satisfaction. Thus, the measure concepts for interoperable Health IT needs to be listed and targeted towards these three metrics.

Definitions

effectiveness: the accuracy and completeness with which users achieve specified goals

efficiency: resources expended in relation to the accuracy and completeness with which users achieve goals

satisfaction: freedom from discomfort, and positive attitudes towards the use of the product.

Identified performance deficiencies/problems/ potential improvements can be found in ISO/IEC 25064:2013.

Usability of exchanged electronic health information

We hope you can find more information on Health IT Usability in our publications at: https://www.nist.gov/programs-projects/health-it-usability

Some of the aspects that can be considered for measure concepts are (Reference: NISTIR 7804 : Technical Evaluation, Testing, and Validation of the Usability of Electronic Health Records http://ws680.nist.gov/publication/get_pdf.cfm?pub_id=909701):

I. Use Error Root Causes—Aspects of the user interface design that induce use errors by users when interacting with the system. They are: patient identification error, mode error, data accuracy error, data availability error, interpretation error, recall error, feedback error, data integrity error.

II. Risk Parameters—These are attributes regarding particular use errors, i.e., their severity, frequency, ability to be detected, and complexity. They are: severity, frequency, detectability, and complexity.

III. Evaluative Indicators—Indications that users are having problems with the system. These are identified through direct observations of the system in use in situ, or through interviews with users. They are: workarounds, redundancies, burnout, low task completion rate, potential patient safety risk.

IV. Adverse Events—A description of the outcome of the use error, and standard classification of patient harm. They are: wrong patient action of commission, wrong patient action of omission, wrong treatment action of commission, wrong treatment action of omission, wrong medication, delay of treatment, unintended or improper treatment, substandard care, morbidity, and mortality.

>Committee Response:

In the context of this framework, usability refers to the ability of stakeholders to acquire and use data when and where needed. We have altered the subdomains to include relevance, comprehensibility, and accessibility, per the Committee's request.

Mala Ramaiah

Application of Exchanged Electronic Health Information

Human Use that has been mentioned as a subdomain of "Application of Exchanged Electronic Health Information" is considered by us as part of "usability." This overlap needs to be addressed appropriately to make them more distinct.

>Committee Response:

In this framework, human use refers to measuring exchanged electronic health information including viewing, interpreting, and applying the data to decisions or other actions.

Mala Ramaiah

Introduction

The NIST health IT Usability initiative is focused on establishing a framework that defines and assesses health IT usability. The initiative will examine the human factors critical to designing usable EHRs and will guide industry in usability engineering practices. The research findings will be used to support the development and evaluation methods for these standards.

We hope you can find more information on Health IT Usability in our publications at: https://www.nist.gov/programs-projects/health-it-usability

>Committee Response:

Thank you for your comments.

Mala Ramaiah

Some of the aspects that can be considered for measure concepts are (Reference: NISTIR 7804 : Technical Evaluation, Testing, and Validation of the Usability of Electronic Health Records http://ws680.nist.gov/publication/get_pdf.cfm?pub_id=909701):

I. Use Error Root Causes—Aspects of the user interface design that induce use errors by users when interacting with the system. They are: patient identification error, mode error, data accuracy error, data availability error, interpretation error, recall error, feedback error, data integrity error.

II. Risk Parameters—These are attributes regarding particular use errors, i.e., their severity, frequency, ability to be detected, and complexity. They are: severity, frequency, detectability, and complexity.

III. Evaluative Indicators—Indications that users are having problems with the system. These are identified through direct observations of the system in use in situ, or through interviews with users. They are: workarounds, redundancies, burnout, low task completion rate, potential patient safety risk.

IV. Adverse Events—A description of the outcome of the use error, and standard classification of patient harm. They are: wrong patient action of commission, wrong patient action of omission, wrong treatment action of commission, wrong treatment action of omission, wrong medication, delay of treatment, unintended or improper treatment, substandard care, morbidity, and mortality.

>Committee Response:

We are including these as measure concepts within Appendix A.

Mala Ramaiah

International standards bodies (ISO 9241-11) define usability as follows: Usability is the effectiveness, efficiency, and satisfaction with which the intended users can achieve their tasks in the intended context of product use.

We suggest that effectiveness, efficiency, and satisfaction be considered the subdomains and the measure concepts tailored to these subdomains of the usability of exchanged electronic health information.

>Committee Response:

In the context of this framework, usability refers to the ability of stakeholders to acquire and use data when and where needed. We have altered the subdomains to include relevance, comprehensibility, and accessibility, per the Committee's request.

National Partnership for Women & Families

Thank you very much for the opportunity to provide input on the Interoperability Measurement Framework. The National Partnership leads the Consumer Partnership for eHealth (CPeH), a coalition of more than 50 consumer, patient and labor organizations working since 2005 to advance electronic health information technology and exchange (health IT) in ways that measurably improve the lives of individuals and families. We have been actively engaged in shaping patient-centered health information exchange polices and applaud the Framework's focus on improving interoperability to support a learning health system in which all individuals, their families, care providers and community/societal supports can send, receive, find and use electronic health information.

As the Framework notes, there is ongoing national movement of programs and people connecting across traditional and non-traditional health care boundaries to improve community health through better data sharing.[1] As data sharing across sectors increases, the development of standards, certification criteria and implementation specifications must evolve to enable better measurement of

interoperability with community-based health services. Finally, just as there are health disparities, there are interoperability disparities. We urge NQF to develop measure concepts and corresponding measures that would identify whether there are gaps in information exchange among different patient and provider populations.

[1] Toward Data-Driven, Cross-Sector, and Community-Led Transformation: An Environmental Scan of Select Programs. Mar 27, 2017 BY Alison Rein, M.S. , Amanda Brodt, M.P.P. Available online at http://www.academyhealth.org/publications/2017-03/toward-data-driven-cross-sector-and-community-led-transformation-environmental

>Committee Response:

We are including a measure concept on interoperability disparities as part of Appendix A.

National Partnership for Women & Families

We are heartened that the Framework's first guiding principle recognizes the role individuals play in health information exchange: "Interoperability is more than EHR to EHR; all sources of data should be taken into consideration." True interoperability includes patients and their caregivers as equal partners in the continuum of care and in electronic access to and use of health information. Patient and family caregivers are key exchange partners when receiving, using and contributing new information that helps provide a complete picture of their health.

The Consumer Partnership identified the following priority use cases for interoperability in 2015 in response to ONC's Interoperability Roadmap. These use cases encompass consumers' priority issues for digital health, namely online access to health information, the ability to communicate and share information with care team members, and electronic tools to help achieve better care and health. We share those uses cases to inform NQF's ongoing work to refine measure concepts and identify specific measures that reflect the full spectrum of health information exchange partners:

Individuals have the ability to access their holistic longitudinal health records when and where needed.

Individuals regularly contribute information to their EHRs for use by members of their care team.

Individuals integrate data from their health records into mobile apps and tools that enable them to better set and meet their own health goals.

Figure 1: The Multiple Faces of Healthcare Interoperability

We appreciate the inclusion of patient-facing technologies that play a role in improving interoperability across the health care ecosystem in the Framework's Figure 1. However, we recommend that NQF choose a broader and/or technology-agnostic term for the corresponding puzzle piece (currently labeled "Patient Portals"). Patient portals are one mechanism for patients to access, use and share health information but consumer access points will quickly evolve. For example, access to information through Application Programming Interfaces (APIs) will become possible as providers adopt 2015 Edition certified health IT, allowing patients to access and coordinate their health data with new tools such as smartphone applications (apps) and other devices. One suggestion is "Patient Portals and Health Apps."

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

National Partnership for Women & Families

We appreciate the inclusion of patient/caregiver engagement and patient/caregiver experience sub-domains in the proposed measurement framework. The relevant measure concepts address priorities that are critical to patients and families, and mirror the HIE priority use cases identified by the Consumer Partnership for eHealth (see our comments on Guiding Principles).

It is not clear why the Framework combines Healthcare Processes and Health Outcomes into a single subdomain, rather than distinguish between measure concepts designed to assess (and close) the gap between standards of care and actual care practices, and concepts that capture subsequent improvements in health outcomes. This

gap is particularly clear in several of the existing measures listed: process measures like assessment documentation for patients with pressure ulcer(s) or lipid screening for older adults and true outcome measures like all-cause readmission rates or breast cancer patients who made progress toward their goals. We recommend further consideration of this subdomain, particularly separating Healthcare Processes and Health Outcomes into individual subdomains.

>Committee Response:

The Committee opted to combine process and outcome as they are referring to concepts, not actual measures. Once the measures are developed from the concepts, they will be classified into either processes or outcomes.

National Partnership for Women & Families

Please see our suggestions for new measure concepts under the individual domain categories. Our comments on proposed measure concepts are as follows:

COMMENT: Number of times a complete and current medical record was accessible to a patient and provider during a clinical encounter (Usability / Relevance)

We agree that the availability of a complete and current medical record is a high priority for providers and patients alike, and would significantly improve interoperability and support the delivery of high-quality care. We encourage NQF to add more specificity around the terms "complete and current;" is the record "complete" from one provider or entity's perspective, or a truly longitudinal, comprehensive, multi-provider record? Most consumers have segments of their health history scattered across multiple providers and settings of care. The average Medicare beneficiary sees two primary care providers and five specialists in four practices. To consumers, a "complete and current" medical record would combine information from multiple providers, health systems and settings into a single, longitudinal record.

We encourage NQF to add more detail around what constitutes a "complete and current" medical record, and call attention the vision outlined in the recent 21st Century Cures Act that calls on the Secretary of Health and Human Services to encourage partnerships: "with the goal of offering patients access to their electronic health information in a single, longitudinal format that is easy to understand, secure, and may be updated automatically," (Sec. 4006. Empowering Patients and Improving Patient Access to their Electronic Health Information).

We also suggest a version of the accessibility of a "complete and current" medical record measure for an episode of care captured by a bundled payment model; a longitudinal health record would be particularly helpful to providers and patients managing an acute condition or relevant after-effects.

COMMENT: How often information was difficult to understand for other reasons (reasons to be determined) (Usability / Comprehensibility)

We offer feedback on those reasons that affect comprehensibility and usability of health information from a consumer perspective. While offering individuals electronic access to health information is a critical step in improving interoperability, some people may require additional technological assistance and/or health literacy support to truly use and benefit from their health information. Consumers often struggle to contextualize lab results, decipher medical jargon, or understand radiology / imaging reports. Supplementing clinical information with explanations or links to background information can help patients understand what the results mean and derive more utility from available health information.

>Committee Response:

The concept in Appendix A does not represent a complete measure, but rather an idea for measure with a description, planned target, and a population. The expectation is that when this is developed into a measure, more specificity will be placed around the term "complete and current". We have also included the definition from 21st Century Cures as to what the framework aspires to.

National Partnership for Women & Families

We suggest the following measure concepts be considered for the Usability domain:

NEW MEASURE CONCEPT: How often a patient's medical record includes information from the patient themselves (or an authorized caregiver) (Usability / Completeness)

The information patients and their family caregivers provide about their health status, care goals, experience of care, abilities and support needs complements clinical information generated by care teams to provide a comprehensive, person-centered view of an individual's health. As the healthcare system shifts towards whole-person care, greater support for prevention, wellness, and independent living is essential. Use of both clinical and patient generated data is a more effective approach for engaging patients and their families, ensuring that care results in better outcomes, and decreasing costs associated with unnecessary readmissions and difficulties with adherence.

We encourage NQF to add a measure concept that evaluates how many medical records have incorporated patient feedback (additions, updates and/or corrections) as an indicator of completeness and usability.

NEW MEASURE CONCEPT: Resolution or correction of patient/caregiver identified errors in the patient's medical record (Usability / Completeness)

As patients and families get easier access to their medical records and health data, it is inevitable that they will have feedback—corrections, additions, and observations to share. Indeed, patients are often the first to identify errors in their own records, and increased access by individuals to their own health information will likely increase the number of errors identified by patients. These could include updated medication lists, non-tolerated medications, other allergies, and more. Patient-provided corrections/ amendments can help improve the accuracy and reliability of data stored in medical records, thus enhancing data quality, as well as enabling more meaningful conclusions to be drawn from secondary uses of this data.

We encourage NQF to consider a measure concept around resolution or correction of patient-identified errors as an indicator of the medical record's completeness.

>Committee Response:

We have added new measure concepts under the usability domain that discuss the information on a patient's medical record. Resolution or correcting of errors was deemed out of scope for this particular project but an important consideration for future work.

National Partnership for Women & Families

We suggest the following measurement concept for the Impact domain:

NEW MEASURE CONCEPT: Frequency of patient or authorized caregiver views, downloads, and transmissions (Impact / Patient/Caregiver Engagement)

It is not enough to measure whether online access functionality is simply turned on ("provided timely access"). To properly measure interoperability, we must measure actual use by patients and caregivers, not just availability of information. National Partnership survey data shows the more frequently individuals access their health information online, the more they report that it motivates them to do something to improve their health (71 percent for frequent users, compared with 39 percent for infrequent users).[1] Simply offering electronic information but not engaging patients to use online access improves neither health care, nor interoperability. Among patients who do not use online access, 35 percent do not know that it is available, and 31 percent report that doctors never discussed the option.

We encourage NQF to add a measure concept and related MU/ACI measures of patients' active engagement with their health information, specifically measuring views, downloads, and electronic transmissions separately as indicators of interoperability from the patient/family perspective.

[1] National Partnership for Women & Families, Engaging Patients and Families: How Consumers Value and Use Health IT, . p. 30 & chart 15 (Dec. 2014), available at http://www.nationalpartnership.org/research-library/health-care/HIT/engaging-patients-and-families.pdf.

>Committee Response:

There are a number of similar measure concepts to what is recommended under the patient/caregiver

experience subdomain and the patient/caregiver experience domain. The Committee opted to not include any of the MU/ACI measures not currently in the framework as examples of the concepts.

National Partnership for Women & Families

We suggest the following measure concepts for the Exchange domain:

NEW MEASURE CONCEPT: Were the clinical staff trained on HIPAA-permissible data sharing with patients? (Exchange / Availability of Electronic Health Information)

Equally important as staff training on accessing data (p. 18) is staff training on permissible data sharing with patients and their authorized caregivers. Through our GetMyHealthData initiative, the National Partnership has documented the significant barriers that individuals continue to face in getting electronic copies of their medical records and other health data, despite longstanding policies designed to improve access to health information. One pervasive barrier is confusion around what HIPAA allows (and in fact, requires) when it comes to sharing information with patients and authorized caregivers, especially electronically. This often means that patients do not get the access to information they need for themselves or a loved one, despite their rights to see and get a copy of their health information.

To further improve the availability of electronic health information to patients and families, NQF should consider a measure concept that addresses staff training on permissible data sharing under HIPAA including the ability for individuals to copies of their health information in electronic forms and formats and via electronic delivery methods (i.e., email, health app via APIs).

NEW MEASURE CONCEPT: Number of documented cases of consumer information blocking (Exchange / Availability of Electronic Health Information)

Hindering individuals in timely access and use of their health records is a prime example of information blocking, defined in 21st Century Cures as actions that inhibit the appropriate exchange, access and use of electronic health information. Information blocking measures would call attention to unreasonable practices regarding individual access, and incentivize modernized policies for securely sharing data with patients and families in an electronic environment. Potentials sources of data include: complaints filed with the Office of Civil Rights regarding violations of the HIPAA individual access right, the number of open APIs available to patients and caregivers to access and share their health information, and possibly any (future) penalties levied for information blocking.

>Committee Response:

There is a concept on training clinical staff on accessing data under the availability of electronic health information subdomain. The Committee opted to not include any measure concepts on data blocking within this framework.

National Partnership for Women & Families

More important for assessing progress in health information exchange and interoperability is patients' use of VDT capabilities, not merely the availability of electronic health information. We encourage NQF to add the following MU / ACI measure in the Framework:

MU / ACI "active engagement" measure: Percentage of patients who actively engage with the EHR by either (1) viewing, downloading or transmitting to a third party their health information, or (2) accessing their health information through the use of an API that can be used by applications chosen by the patient.

We also recommend the following health information exchange MU / ACI measure be added to the list:

MU/ACI Clinical Information Reconciliation Measure: Clinician performs clinical information reconciliation for the following three clinical information sets: (1) medication. Review of the patient's medication including the name, dosage, frequency, and route of each medication; (2) Medication allergy. Review of the patient's known medication allergies; (3) Current problem list. Review of the patient's current and active diagnoses.

>Committee Response:

The Committee opted to not include any MU/ACI measures not currently included in the framework as representative examples of the measure concepts.

National Science Foundation

The Health IT NITRD (NITRD) working group commends the ONC for making concerted efforts in addressing interoperability of data, devices and people, a critical and often overlooked aspect of health information technology. This is a critical issue for patient safety, health care system function and efficiency, and the US biomedical research community. HITRD has recently completed a Strategic Framework (Link) that also stresses the criticality of interoperability in health information technology.

It is our understanding that this newly developed framework is meant to encompass all aspects of medical and healthcare data interoperability, but it seems the greatest focus of the document is on the exchange of information between Electronic Medical Records (EMR) /Electronic Health Records (EHR) for conventional offline use. To meet the needs of rapidly transforming health care systems, health technologies, biomedical, computing and engineering research, this framework should broaden its scope to include all types of health data generated by medical and consumer-grade devices. Interoperability of health information must include the data captured from multiple and new types of medical devices, as well as the incoming data from automated systems that by the necessity transform it, in real-time, into clinically actionable information for more accurate diagnosis, treatment and prevention. Interoperability must include both the intermediate data and technical interoperability requirements of formats, protocol interaction standards of automated medical devices and clinical computations as well as the end result health information interoperability to support a variety of users of this information. The future of health information is not EMR/EHR-centric, but rather personalized by providing knowledge and decision support to patients, caregivers, providers and care teams in real-time. Multiple systems, medical device and data interoperability are essential to that future and more emphasis could be included in this framework.

>Committee Response:

While medical devices/wearables are out of the scope of this project, the "Interoperability Is More Than EHR to EHR" section will be updated to include this attribute and the others listed above. Additional work around medical devices and interoperability should be considered.

ONC

There should be a separate section on the definition of interoperability. The 21st Century Cures Act definition of interoperability should be referenced rather than the Interoperability Roadmap's definition. Certain components of the definition are missing (see below); please include those elements within this section. "Interoperability" with respect to health IT means (1) Enables secure exchange and use of electronic health information without special effort by the user; (2) Allows for complete access, exchange, and use of all electronically accessible health information for authorized use; and (3) Does not constitute information blocking (as defined in section 4004).

The measurement framework should consist of concepts that align with the key components of this definition. This is critical for ensuring value and relevancy of the framework going forward. This definition was passed via Cures after ONC had its Roadmap in place; it is important to include the Cures definition but not make it appear as though the Roadmap followed.

>Committee Response:

The definition of interoperability will remain consistent with that included in the ONC Nationwide Roadmap to Interoperability, but we will include the 21st Century Cures definition as something this framework aspires to.

ONC

Similarly, how should the report address and classify "view only" access to an EHR or via a portal? From ONC's perspective this might be a considered a form of exchange as it allows for the sharing of information across disparate systems and providers; however, it doesn't allow for the incorporation or downstream use of the information, which would involve interoperability. Again, depending upon the use case or purpose, view only access may be sufficient and adequate to meet the needs of the stakeholders involved.

>Committee Response:

The scope of the work was focused on the development of measure concepts to assess interoperability and its impact on healthcare processes and outcomes. The Committee considered send, receive, find, and integrate as components of interoperability, not just "view only."

ONC

The 21st Century Cures Act includes information blocking as a key element of interoperability. Information blocking should either be included as a separate subdomain within exchange or it should be explicitly described within the subdomain availability. Dr. Milstein's measures related to information blocking should be included in Appendix B.

>Committee Response:

Data blocking was discussed extensively by the Committee. While data blocking is out of scope of the project, the report could benefit from a clearer definition and explanation of the role data blocking plays in interoperability. Additional language will be added to the report.

ONC

Availability should refer to ONC's Interoperability Roadmap concepts of sending, receiving, finding (querying) and integrating electronic health information more explicitly. Measures related to these concepts could be included in Appendix B by referring to the current reporting that ONC does related to this; additionally, it could be called out to develop more sophisticated and/or system-generated measures of this so we can report on the extent to interoperability is occurring.

>Committee Response:

The measures presented in Appendix B are representative examples of the measure concepts. As a consensus-based entity and endorsement body of quality measures, NQF can offer specific guidance on measure development. The concept were designed around the domains and subdomains in the framework to assist in the assessment of interoperability and its impact on healthcare processes and outcomes.

ONC

The patient perspective should include examples and measures beyond VDT. ONC would suggest adding more patient-related measures and examples, such as those that relate to exchange and incorporation of patient generated health data within EHRs.

>Committee Response:

Thank you for your comments. The Committee deemed that the measure concepts in Appendix A related to patient/consumer engagement and patient/consumer satisfaction were sufficient.

ONC

The role of trust and privacy/security in enabling interoperability is missing from the framework. This could be included as a part of the existing subdomain of method of exchange; however, it is important enough to call out as a separate subdomain. A number other agencies (SAMSHA, DOD) have commented on the need for inclusion of privacy/security. We will need measures related to privacy/security to ensure that the exchange of health information is occurring in a secure manner. For example, there are complexities associated with this in the behavioral health/substance abuse area that might warrant separate measures.

>Committee Response:

Subtopic areas around confidentiality and privacy were added to the subdomain availability of electronic health information, while security were added to the subdomain method of exchange.

ONC

ONC prefers that integration with clinical workflow (accessibility) should be a separate subdomain. It is considered an important reason as to why information that is exchanged is not used. Our national surveys have shown that a commonly cited reason as to why information that is exchanged is not used is because the information is not accessible—either it is not integrated within clinical workflow or not available within the EHR. Currently it is included within relevance; however, relevance typically refers to the content of the information rather than whether and how the information is presented or displayed.

For example, a measure could be is the information displayed within a system or displayed separately.

>Committee Response:

The Committee opted to create a subdomain entitled accessibility within the usability of exchanged electronic health information domain.

ONC

Should completeness be a distinct subdomain or should it be included under relevance? It is included separately under Appendix measure A however the text describes this as under the subdomain of relevance. ONC thinks it could be included under relevance however it just needs to be clarified with the committee.

>Committee Response:

Thank you for your comment. Completeness is not a distinct subdomain and we will make that correction in the final draft.

ONC

ONC thinks it is important to measure provider burden as an outcome of interoperability. Assesses the potential for interoperability to reduce provider burden (and prevent burnout and improve quality of work life) is critical. Provider burden should be a concept that is more explicitly called out as an outcome. This was seen as distinct from productivity. This might be worth bringing up to the committee as a topic for discussion.

>Committee Response:

Provider burden was not deemed necessary to develop as a separate concept as developers who create measures from the concepts must already account for provider burden.

ONC

The ability of interoperability to spur innovation, competition, and greater efficiency in health care delivery is also noted by the FTC in their informal comments. They note the following:

As you know – and as the Interoperability Roadmap recognizes as a "guiding principle" – it is important to encourage innovation and competition. That principle extends not only to innovation and competition in the health IT market itself. Interoperability can and does facilitate competition among health care providers who utilize health IT in caring for patients, and it also promotes innovation in determining how to design health care delivery systems. We think these points are worth emphasizing.

This could be included within the subdomain of "Improved Healthcare Processes and Health Outcomes," however, the way it is currently defined isn't inclusive of that. The FTC noted in their informal comments: The sharing of health care information can also promote competition by making it easier for patients to switch between health care providers, and it can spur innovation in health care delivery by enabling providers to organize and collaborate more efficiently.

>Committee Response:

The purpose of the framework was to create measure concepts to assess interoperability and its impact on healthcare processes and outcomes. Its ability to spur innovation - while important - is outside of the scope of this project.

ONC

Add ONC's current measures of interoperability to Appendix B. These measures are based on the Interoperability Roadmap domains and leverage national survey data for reporting. To the extent that the measures represent an inventory of existing measures that align with the domains, ONC's measures should be included. ONC can provide the measure specifications. The measures relate to electronically sending, receiving, finding, and integrating information. We also use measures related to the availability of electronic health information from outside sources at the point of care and usage of health information for clinical decision making. We do seek to identify complementary measures and more sophisticated measures. However, having these measures on the list will make measure developers aware of their existence and they can use these as a basis for creating more sophisticated measures that align with these concepts.

>Committee Response:

The Committee opted to not include ONC's existing

measures of interoperability, nor any MU/ACI measures not currently included in the framework.

ONC

Please include MU/ACI measure relating to information reconciliation as an example of an existing measure that relates to use. There are also national survey measures (physician, hospital, SNF, individuals) that exist that relate to these domains of exchange, usability and use. I think it would be worthwhile to include and acknowledge these even though we are seeking to identify system generated measures through this work. I can walk you through these for inclusion in the report.

>Committee Response:

The Committee opted to not include any MU/ACI measures not currently in the framework to the final report. Additionally, the scope of work specifically asked to focus and emphasize on system-generated measures, which is why the measures in Appendix B were chosen. The other measures may be used for future work.

Philips Healthcare

Philips Wellcentive supports the concept of use case-driven standards and measures to assess the clinically relevant use of interoperability to support improved health outcomes and sustainability.

We strongly support a public-private collaboration as the best means to achieve mutual advancement of interoperability strategies and processes.

To that end, and to the mutual benefit of industry stakeholders, HHS and its agencies, what's immediately needed is clarity on the processes and timelines of various agency and Congressional intent around interoperability, including those within this document, all toward informing and completing the goals of the ONC roadmap.

For example, in April of 2016, ONC issued an RFI entitled "Assessing Interoperability for MACRA." Briefly, this RFI sought input on ways to measure interoperability (MU data and provider surveys as put forth) as mandated by the MACRA legislation. Final results/recommendations are to be published by July 1, 2017, just days away. Our comment to the April, 2016 ONC RFI can be found here.

We would seek clarity on whether those results are forthcoming and whether they are to inform the NQF project, or are to be included in the final assessment of a new ONC proposal from April of 2017 entitled "Proposed Interoperability Standards Measurement Framework." This document seeks public comment by July 31, 2017.

Page 9 of this new ONC document states, "In three to five years, ONC seeks to coordinate with stakeholders to define uniform electronic measures of the implementation and use of standards that can be built into health IT developers' products. This approach will provide more accurate information compared to self-reported survey data, and automating the process will ease the burden of capturing and reporting the data."

In terms of clarity, does this passage coordinate with the language around "electronic measures" equal to that of the NQF document, as well as the timelines put forth? The NQF document notes timeframe estimates within Appendix A of short-term (0-3 years), mid-term (3-5 years) and long-term (5+ years). Should the measurement capabilities of the new ONC document be utilized prior to the issuance of interoperability quality measures as put forth in the NQF document? And so on.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

Philips Healthcare

Going further, the MACRA legislation seeks "widespread" interoperability within the year 2018. In the above-noted "Assessing Interoperability for MACRA" RFI, ONC authors posited whether widespread interoperability would be defined as either a simple majority of greater than 50% of identified tasks being accomplished, or whether a greater percentage value should be pursued.

We believe that exchange for the sake of exchange, and/or incentives applied to exchange for the sake of exchange is not the answer, and again support

the concept of the NQF document. Interoperability check-marking without use cases matched to standards will not keep pace with the all-payer movement to value-based care and population health management.

And as we are also sure the authors are aware, 21st Century Cures legislation also imposes timelines on ONC publication of a trusted exchange framework and of networks that have adopted it, along with its language on data blocking and penalties.

Again, we assume these factors are in your awareness, which stresses the need for a coherent and stated plan encompassing these efforts the industry can understand and embrace.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

Philips Healthcare

Interoperability as a Quality Measure Set

There has been much historical discussion within the industry and HHS around a provider "business model" or "business case" for interoperability implementations or advances at the practice or health system level, some of which have focused on incentives.

We believe that value-based care payment models are the incentives to advance interoperability functions, along with specific exchange criteria remaining within MIPS ACI measures and attendant certification criteria. Additionally, we foresee little appetite within HHS for outright provider adoption incentives in a post-meaningful use era, more so in light of the recent OIG report on MU payments.

Therefore, assessing exchange-related measures from existing programs as shown in Appendix B of NQF's Measurement Framework document is a credible approach to advancing clinically relevant metrics.

At the same time, new measures such as those put forth in Appendix A need more detailed use cases - the need for the measures - for NQF/CMS/ONC to understand clinically relevant provider and developer needs of new measure sets, whether for basic measurement means or more intricate quality measure submissions and tracking.

To that end, NQF and federal agencies should quantify the logic matched to the creation of measures, instead of drafting measures matched to broader domains, and do so building upon the stakeholders assembled for this document.

We believe this to be a manageable process, given our understanding from attendance at recent NQF meetings on this document topic that a more concise measure set is to be formed from the so-far broad nature of Appendix A.

Use case formation could also be expanded to examining areas in which the effects of non-interoperability can be improved upon toward clinical care and outcomes, done as an inverse measure approach. A lower effect of non-interoperability could signal an opportunity for better interoperability performance, and hence an equally valid measure/indicator. Again, framed as use cases, healthcare professionals can identify lost interoperability-enabled opportunities for efficiency and effectiveness of care, providing more specific areas/use cases in which to focus improvement efforts. This approach is concurrent with that on page 16, paragraph 2 of the NQF framework proposal.

Combined, these approaches could heighten provider buy-in into pursuing interoperability technology and functions, which is often cautionary due to HIPAA concerns, governance rules and integration costs, among other areas. One 2016 provider survey found a very mixed landscape of success in terms of API integration with legacy EMRs.

>Committee Response:

The Committee has extensively spoken about using use cases to illustrate different aspects of the framework but ultimately decided that it was not feasible for this work. Additional work around developing use cases or testing the use of the framework should be considered for future work.

Philips Healthcare

Supporting the Scope of the Project

We support the draft's needed recognition that interoperability transcends legacy definitions around

EMR to EMR platforms, and specifically support the passage around the functionality of QCDRs in relation to population health management, and that of mobile health devices and other patient-centric home monitoring technologies.

Likewise, we support the passages as subtitled Various Data Types, recognizing that nonclinical and nontraditional data and sourcing needs to be accounted for. Social determinants of health data are increasingly being sought as an aspect of PHM in terms of patient risk scoring and care planning.

And tangibly within existing value-based care programs, CPC+ participants are to begin capturing and assessing behavioral health data, with expectations of exchange, in year three of the program, and here attendant certification criteria already exists within 2015 Edition options. We also note the inclusion in Appendix B, page 24, of CPC+ regional learning as a relevant measure concept/use case, matched to an existing measure.

Overall, this exchange expansion of data types speaks to the like-minded expansion of provider types desired over time within the definition of eligible clinicians in MACRA.

>Committee Response:

Thank you for your comments.

Philips Healthcare

Making Standards Standard

To achieve the goals of the NQF document, we believe ONC should take a stronger approach to compliance with its standards advisories to alleviate historical developer variations allowed within standard types. These variations lead to issues around a lack of uniformly readable data, referenced in the NQF document in terms of vocabulary and terminology, to which we would add transport.

To this end we regret the 2017 ONC standards advisory's language around eliminating designations of "best available" standards as a pulling back from the agency's mission. We appreciate ONC's historical approach to collaboration and ongoing innovations, but evidence tells us that all stakeholders need a process that cannot be dismissed as a mere federal exercise.

The question is how to finally get to real consensus and usage, be it through certification or very clear standards used for any future quality measure scoring or reimbursement tied to interoperability measures.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Philips Healthcare

Examples and Detailed Appendix Comments

As to specific comment on language within Appendix A, and as an example of the impact of standards variations, we refer to pages 20 and 21. On page 20, domain Exchange, subdomain Method of Exchange, and again on Page 21, domain Usability, subdomain Computable, we see the following phrasings: "Number of data elements that could not be parsed or interpreted by a receiving system," (page 20) and "Data could not be parsed or interpreted by a receiving system"/"Data could not be used by the provider or members of the care team in the provision of care" (page 21).

Overall, we would seek clarity on whether the ultimate onus of responsibility would be on the sending or receiving system, though the interpretation seems to be on the sending system. We would also point out the arguably vague inclusion of the phrasing around "Data could not be used…".

And as a further illustration of the challenges of standards variations and the impact on areas of proposed language in Appendix A, Philips Wellcentive is a PHM data aggregation solution, which collects data from the many disparate EMRs existing within a given health system.

Currently, our platform processes up to 400 million data points per day. During the aggregation process, on a normal basis more than 50 percent of the data aggregated is custom in its origins, meaning a normalization/data quality process must be done before the data can be uniformly used and read for quality reporting, risk analysis, care management and other clinical functions. This is, in part, due to the fact that ONC's standards advisory allows or promotes the use of LOINC or SNOMED. Internally, we have no issues utilizing both, but would have less

processing if one emerges as a measureable standard or metric leading to more efficient interoperability. And as a minor note toward Appendix A language, again would this intermediary status designate our platform as the receiving or sending system?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. They are not fully specified measures at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on quality processes and outcomes.

Philips Healthcare

Also on page 20, Exchange/Method of Exchange, pertaining to the "use of nationally recognized standards and clinical vocabularies within a clinical environment to communicate with nonclinical systems" – here again we refer to above comments on a very clear and agreed upon standard, with a certification or level of adherence, to avoid ongoing variations as currently experienced within the industry. This is in fairness to all stakeholders, and to help eliminate one area of finger-pointing as to why interoperability does not work.

In closing, we urge NQF and its interoperability committee to advance definitiveness into ONC standards advisories toward quality usage, and we would then further support measuring the amount and clinical relevance of patient data exchanged that matches clear standards. Adding use cases or value statements or business needs to quality measure sets could then make sense as anticipated for any future policy language.

Finally, we would urge NQF and the committee to continually expand its private sector stakeholder voice. Philips, which is expanding the functionality of interoperability and the care settings in which it must occur, would be honored and willing to help.

>Committee Response:

Thank you for your comments. This is not in the scope for this work. However, it is useful feedback for potential work in the future.

Richard Hornaday

3) Technical concerns – Can you provide the description of technical means proposed to gather each measurable concept? This will greatly help us to provide feedback.

Examples.

Data elements that were captured electronically but not exchanged between at least two recipients – As defined this should not be a short-term timeframe. There are technical difficulties to estimating this based on the definition alone. This could also be reframed using a "FHIR" definition, such as number of resources requests had no corresponding resource.

Amount of provider time spent search for information that could have been available electronically (e.g. allergies, immunizations) – Need details on how this may manifest in the technology. How to measure time searching and how to tell what they are searching for? This is listed as a short-term timeframe.

How often information was difficult to understand because of formatting – Need details on how this may manifest in the technology. Or is this information to be gathered by survey or UI evaluation?

Data could not be used by the provider or members of the care team in the provision of care - Is this to be asked via survey?

>Committee Response:

Thank you for your comments. Appendix A includes a list of measure concepts, which is an idea for a measure that includes a description, a planned target, and a population. It is not a fully specified measure at this time. Your comments are helpful to those who will develop the concept into a measure to assess interoperability and evaluate its impact on healthcare quality processes and outcomes.

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