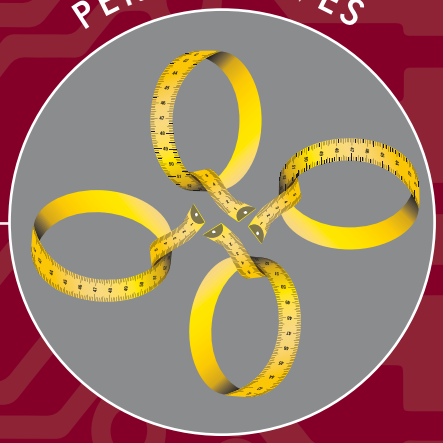
Health IT-Enabled Quality Measurement

PERSPECTIVES



PATHWAYS

PRACTICAL GUIDANCE

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HEALTH IT

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Foreword

Quality measurement enabled by health information technology (IT) is an evolving field that seeks to support systems of quality improvement. The value of quality measurement is related to the completeness of reporting, context, consistency in meaning, and the recipient's ability to act upon the information. Health IT holds great promise for facilitating accurate and timely reporting of measures to intended users, such as clinicians, caregivers, patients, payers, and public health officials. Diversified stakeholders of varying resources and priorities are striving to make advancements in health IT-enabled quality measurement.

For more information on the Pathways to Quality Through Health IT initiative, go to the Health IT-Enabled Quality Measurement Web page.

Innovative advances in the field are frequently incremental. Capabilities of technology and care delivery processes evolve as the health care delivery system evolves; thus, we need to consider both the current and future state. With public and private partners in 2012 and 2013, we gathered at the blackboard of discovery to solicit stakeholder thoughts on current challenges, infrastructure gaps, and successful strategies, which are critical to the next phases of health IT-enabled quality measurement and reporting. These stakeholders resoundingly expressed their commitment to create and use health IT-enabled quality measurement in order to support a system of eImprovement (i.e., a comprehensive system of measurement and improvement, which is described in this report). This report presents stakeholder insights in a tiered fashion, offering readers the opportunity to glean summary findings (Section 3) or explore contextual information provided in more substantive narrative (Appendix A). Their reflections fall into three types of findings:

- ***Perspectives***—Differing perspectives inform stakeholders' priorities, investments, and expectations in their pursuit of health IT-enabled quality measurement and the extent to which such quality measurement is able to support efficient system(s) of quality improvement. By exploring the characteristics and implications of these perspectives, tradeoffs and opportunities for coalescence can be realized. (Section 3.1)

- ***Pathways***—A number of critical topic areas need to be addressed in order to advance health IT-enabled quality measurement. In this paper we focus on measure development, implementation, and testing; data elements and data capture; data access, sharing, aggregation, and integration; patient engagement; and collaboration and education) (Section 3.2)

- ***Practical Guidance***—Delineation of 111 prospective research activities or infrastructure enhancements are organized around five topic areas (Section 3.3). An illustrative catalog of more than 150 programs and initiatives active in the area of health IT-enabled quality measurement is searchable by program characteristics (Appendix C).

Related AHRQ-Sponsored Web Conference

A free, AHRQ-sponsored Webinar titled "A National Web Conference on *Health IT-Enabled Quality Measurement: Perspectives, Pathways, and Practical Guidance*," will be held September 13, 2013, from 2:00–3:30 p.m., EDT.

Presenters will provide insights from this report—Health IT-Enabled Quality Measurement: Perspectives, Pathways, and Practical Guidance—and the associated RFI responses and focus groups.

To register for the Webinar or review the transcript and presentation slides after it has ended, go to http://healthit.ahrq.gov/events.

The Agency for Healthcare Research and Quality (AHRQ) would like to thank the Request for Information and Public Comment respondents and focus group participants for their generosity in sharing their time and knowledge. Their insights were critical to advance the knowledge base on the intersection of health IT and quality measurement, which is provided in this report. Given the highly dynamic nature of health care, continued dialogue among stakeholders is needed not only to discuss ongoing issues, but also to ask new questions. AHRQ looks forward to ongoing collaboration with stakeholders to continue identifying areas in need of further research and to disseminating successful strategies for improving health IT-enabled quality measurement.

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Executive Summary

Purpose and Context

Improving the quality of care is a top priority for the United States' (U.S.) health care system. Accordingly, there are a myriad of efforts underway to improve quality through both payment and health care delivery reform. Both health IT and quality measurement factor strongly into a reformed health care delivery and financing system. This report examines the intersection of health IT and quality measurement, reflecting the expectation that health IT-enabled quality measurement can accelerate quality improvement. Stakeholders suggest that cycle times for quality improvement can be reduced, as meaningful, actionable information becomes available to decisionmakers (e.g., patients, families, and clinicians) in real or near real-time for care management. System-wide information could also be available for payers, providers, and purveyors of public health through the accurate and efficient use of technology. This concept is referred to as "eImprovement" in this report.

The July 2012 publication of an *Environmental Snapshot*—*Quality Measurement Enabled by Health IT: Overview, Challenges, and Possibilities*—provided a framework for this project. AHRQ subsequently sought the public's input to identify the near term feasibility and priorities of various activities that could enhance measurement to support eImprovement through a series of stakeholder engagements. A Request for Information and Public Comment (RFI) was posted in the *Federal Register*, followed by the convening of a series of focus groups with various health care stakeholders (e.g., consumers, government, measure developers, providers, payers, vendors).

This report, *Health IT-Enabled Quality Measurement: Perspectives, Pathways, and Practical Guidance,* presents a high-level summary from the 15-question RFI and subsequent reflections provided by focus group participants on how to advance quality measurement enabled by health IT, as well as provides a list of RFI respondent and focus group participant suggested incremental steps toward advancing health IT-enabled quality measurement. While insight from patient-focused stakeholders was sought, this report does not fully explore the concerns, priorities, or needs of patients and their families. The RFI respondents and focus group participants recognized the importance of meaningful engagement by patients and their families, and offered some suggested pathways to enhance their engagement. The material in this report is organized to offer readers both high-level summaries of findings as well as contextually relevant discussions. This report is presented to share information, stimulate discussion, assist communication among stakeholders, facilitate understanding, and provide guidance on potential infrastructure enhancements that could be pursued, individually or collectively.

The Appendixes to this report summarize the input received as well as catalog the efforts of many organizations who are engaged in efforts to improve quality through health IT.

- Appendix A—a more comprehensive summary of the findings from each RFI question as well as summaries of the focus group findings.
- Appendix B—the methodology and approach for each of the stakeholder engagement activities
- Appendix C—A Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT describes over 150 different programs and initiatives across public and private programs
- Appendix D—a list of the RFI respondents and focus group participants who were incredibly generous with their time and insights
- Appendix E—additional resources on health IT-enabled quality measurement

Background

Until recently, quality measurement relied almost exclusively on the use of electronic claims data, manual chart abstraction, and patient surveys. However, the enormous, recent growth in the adoption of health IT provides an opportunity for more efficient quality measurement, the development of new types of measures serving various purposes and end users, and tighter integration between quality measurement and quality improvement. The sudden increase in availability of digital information raises expectations across all stakeholders who use, work with, or oversee aspects of the health care system with respect to how data can be used to improve care, while many of those same stakeholders are simultaneously facing the challenges associated with acquiring new health IT systems and integrating them into the health care delivery organization. Although there is a great deal of consensus among health care stakeholders on a number of recurring ideals for health IT-enabled quality measurement—the need for patient-centricity and involvement, the importance of collaboration, the desire to align measures to national priorities, the importance of actionable measures in a system of quality improvement, and the need to use technology to support measurement—priorities may be different for various stakeholders.

Reflections: Perspectives, Pathways, and Practical Guidance

Given that advances in quality measurement are occurring in parallel with many other changes to health care delivery and payment, there is a need to consider the impacts of quality measurement on the overall health care system. Despite their common commitment to advancing health IT-enabled quality measurement, stakeholders vary on the degree to which they find it necessary that quality measurement instigates system-wide innovation that results from the concurrent changes to the health care systems, processes, and resources. A number of diversified perspectives emerged during stakeholder engagement activities (i.e., RFI and focus groups). It is of note that these perspectives were not singular for a particular type of stakeholder. Moreover, a given stakeholder may have expressed differing perspectives across projects and even within the deliberation of a particular infrastructure challenge.

For the purposes of this discussion—and to reflect the singularity with which participants expressed priorities at any one time—four perspectives were simplified and distilled as follows:

- ***Quality measurement accelerating systemic quality improvement as the highest priority—*** Measurement should be focused on improving quality and developed recognizing its impact on and integration into the quality improvement enterprise for various stakeholders and purposes. Although burden and impact should be considered, measures and their integration within a quality improvement system does not need to be limited to current care delivery or health IT systems capabilities.

- ***Quality measurement maximizing the current capabilities of health IT—***Measurement should leverage all currently available health IT (e.g., electronic health records, registries) necessary, but constrain measure specifications to information that could reasonably be assumed to be generally available and widely accessible today to minimize implementation burden.

- ***Quality measurement relying on the current capabilities of a given delivery system***—Measurement should be a byproduct of care delivery and seek to minimize impact on clinician workflow. Measure specifications should be constrained to information that would reasonably be needed to support care and meet current reporting requirements.

- ***Centralized prioritization of measures, balancing perspectives***—New measure development priorities should be driven by an authoritative entity through declarative means and tradeoffs in the above perspectives are explicitly managed. Quality measurement programs should be aligned and harmonized uniformly through a centralized multistakeholder process.

In actuality, one could expect a hybrid of perspectives, informed by the intended objective, resources available, and changes anticipated to provide the framework for a new health IT-enabled quality measurement.

This report highlights stakeholder views on each topic. At a high level, there appeared to be agreement about the importance of each topic; however, there were often diverging thoughts on how to operationalize solutions and how to prioritize iterative advancements in health IT-enabled quality measurement. Progress continues to be made in advancing health IT-enabled quality measurement. RFI respondents and focus group participants identified several topics as essential building blocks toward advancement of improved health IT-enabled quality measurement. These categories are presented somewhat chronologically in the process of quality measurement evolution, rather than relative priority of the issues:

- Measure development, implementation, and testing
- Data elements and data capture/tools to process unstructured data
- Data access, sharing, aggregation, and integration
- Patient engagement
- Collaboration and education

As key topics are discussed in this report—measure development, implementation, and testing; data elements and data capture; data access, sharing, aggregation, and integration; patient engagement; and collaboration and education—tradeoffs are discussed through the lens of these perspectives where explored by stakeholders. For example, the priority for new measures may vary according to the perspective of the respondent and the particular issues raised through questions or conversations. RFI respondents, focus group participants, and researchers almost universally supported new measurement in areas that reflect new expectations of the care delivery system, such as care coordination, outcomes, and longitudinal measures. Each of these new measurement areas are aimed to change the status quo. However, the timing and specifications of these new measures may be approached or prioritized differently by stakeholders with different perspectives (i.e., quality measurement accelerating systemic improvement as the highest priority, quality measurement maximizing current health IT capabilities, and quality measurement relying on the current capabilities of a given delivery system).

Is measurement an agent of change or is it a reflective measure of progress toward change? Both of these perspectives are valid. Ultimately, it was clear that there is no singular path to the realization of optimal eMeasurement and eImprovement. The dissemination of examples and suggestions is important in order to leverage developments from various approaches. The Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement contains a list of all the stakeholder suggestions from the RFI and focus groups and Appendix C provides a catalog with examples from which stakeholders may gain insights.

Pursing Pathways to Achieve eImprovements

Throughout the stakeholder engagement activities, the long-term vision for quality improvement remained consistent: health-IT enabled quality measurement is an integral element of eImprovement. Stakeholders discussed that each quality measure should serve a specific purpose and be incorporated within a system of quality improvement. This means that health IT would facilitate measurement so that performance results can be shared with measure end users (e.g., clinicians, care givers, patients) in a timely manner to improve health care outcomes. eImprovement is reliant upon rapid feedback loops that would be supported by meaningful, actionable performance information at the patient and provider level, hospital and health system level, as well as at the population level.

The various issues presented in this report—measure development, implementation, and testing; data elements, data capture, and tools to process unstructured data; data access, sharing, aggregation, and integration; patient engagement; and collaboration and education—need to be reconsidered periodically to facilitate the prioritization of activities needed to continue the advancement of health IT-enabled quality measurement. Stakeholders engaged in the ongoing dialog should reflect on the various perspectives on quality measurement identified in this report to frame future deliberations and identify optimal paths going forward. Individuals and institutions may see their objectives, priorities, and paths forward differently. Patient perspectives will particularly need to be considered more carefully. Additionally, new perspectives may emerge with advancing technological capabilities and changing environmental factors (e.g., evolving medical curriculum, certification requirements in the use of EHRs, quality measurement, quality improvement; reimbursement; delivery system). "Furthermore, measure concepts must be prioritized based on the potential population-wide effect of achieving improvements in that measure."[1]

With continued collaboration, the paths forward may be different but the destination will be the same—the successful next generation of quality measurement. Evolving quality measurement enabled by health IT can facilitate eImprovement and provide a foundation for advancing the "Triple Aim" of better health and better care at a lower cost.

1. Introduction

Improving the quality of care delivered in the United States (U.S.) health care system is a top priority. Quality measurement enabled by health IT is an essential component of quality improvement. Given the rapid adoption of health IT and the importance of quality measurement to assess progress toward quality improvement, stakeholders throughout the health care system recognize the importance of examining the intersection of health IT and quality measurement. Realizing the transformative potential of health IT-enabled quality measurement will require both new and improved measures, improvements to the technical infrastructure supporting quality measurement, enhanced reliability of quality data, improved policy guidance, enhanced systems of monitoring those values, and a means to mitigate quality improvement challenges.

The Agency for Healthcare Research and Quality (AHRQ) has been a leader in building the evidence base on quality measurement enabled by health IT. AHRQ has supported a continuum of research activities, innovative demonstrations, approaches, and methodological work in this area through their Health Information Technology Research Portfolio. As the Centers for Medicare & Medicaid Services (CMS) and the Office of the National Coordinator for Health IT (ONC) act to implement meaningful use, AHRQ continues to pursue various activities in concert with other Federal agencies to discern and disseminate successful strategies, challenges, and prioritized possibilities specifically pertaining to the intersection of quality measurement and health IT.

Given the multitude of activities occurring at the intersection of quality measurement and health IT, this is an ideal moment for active dialogue with stakeholders, discussion about the challenges in the field, and a more detailed consideration of the many stakeholders and their contributions. AHRQ seeks to identify pathways to the next generation of quality measurement to support the "successful transformation of the health care system to achieve better health outcomes as efficiently as possible."[1]

In 2012, AHRQ released an *Environmental Snapshot*—*Quality Measurement Enabled by Health IT: Overview, Challenges, and Possibilities*—which described possibilities for the advancement and challenges to the advancement of health IT-enabled quality measurement as identified in the literature. Following the publication of the *Environmental Snapshot,* further research and stakeholder engagement activities were conducted on the topic of quality measurement enabled by health IT. A Request for Information and Public Comment (RFI) with 15 questions was posted in the *Federal Register* and received 63 unique responses from a diverse set of stakeholders. Subsequently, a series of focus groups was held that consisted of 64 stakeholders from across the health care enterprise (e.g., vendors, measure developers, payers, providers, consumers, and government) to further discuss issues that arose in the RFI.

> RFI respondents and focus group participants were made up of a diverse set of stakeholders that included representatives of: consumers, government, measure developers, payers, providers (including medical specialty societies), purchasers, researchers, and vendors. Organizations that represented consumers participated; however, patients and their families did not directly participate. It should be noted that these important stakeholders have expectations and uses for measures which may not be reflected in the perspectives, pathways, and practical guidance featured in this report.

This report contains findings from the RFI and the focus groups. The material in this report is organized to offer readers both high-level summaries of findings as well as contextually relevant discussions. The observations are presented to share information, stimulate discussion, assist communication among stakeholders, facilitate understanding, and to provide guidance on potential infrastructure enhancements which could be pursued, individually, or collectively.

Appendix A provides a full summary of each stakeholder engagement activity and Appendix B provides the methodology and approach used for each stakeholder engagement activity. During the research process for the *Environmental Snapshot*, numerous programs and initiatives were identified that are working toward improving quality measurement enabled by health IT. Additional projects and programs were identified during stakeholder engagement activities. These are presented in the Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT (Appendix C).

The Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT, Appendix C is searchable through the use of "tags" by project type, health IT topic, care setting, and illustrative subpopulations. This catalog provides examples and retrospective practical guidance on over 100 programs and initiatives being conducted by—

- Federal Government
- State/Regional Communities
- Private Organizations

The Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement (Section 3.3) in this report contains over 100 suggested next steps from RFI respondents and focus group participants. These recommendations provide some prospective practical guidance for a broad set of stakeholders throughout the health care system. Suggestions are categorized as:

- Measure development, implementation, and testing
- Data elements and data capture/tools to process unstructured data
- Data access, sharing, aggregation, and integration
- Patient engagement
- Collaboration and education
- Other topics and recommendations

This catalog of programs and initiatives is not exhaustive, but rather, illustrates the breadth and depth of the work being conducted by a variety of the stakeholders (e.g., Federal, State/Regional, and private) discussed in this report. Appendix D contains a list of the RFI respondents and focus group participants, who so generously gave of their time and knowledge. Additionally, a list of further web resources on quality measurement enabled by health IT is provided in Appendix E.

2. Background

The Institute of Medicine (IOM) reports, *To Err is Human: Building a Safer Health System* and *Crossing the Quality Chasm: A New Health System for the 21st Century,* changed how health care was perceived and discussed in the United States.[2,3] These reports highlighted the need to improve the quality of health care in the United States. Since the publication of these reports, there has been much discussion and activities toward achieving a system that delivers high-quality care consistently, as described in *Crossing the Quality Chasm.*[3] Meanwhile, rising costs continue to be a major concern in the United States (U.S.) health policy landscape, particularly given the evidence that higher costs are not necessarily correlated with higher quality. Improving the U.S. health care system will require pursuit of three aims: "improving the experience of care, improving the health of populations, and reducing per capita costs of health care."[4] Health IT and quality measurement are critical tools needed to achieve this "Triple Aim."

The 2012 *Environmental Snapshot* provided an overview of the challenges and possibilities for advancing health IT-enabled quality measurement. Throughout the subsequent stakeholder engagement activities, RFI respondents and focus group participants acknowledged the challenges, but overwhelmingly demonstrated a desire to work together to evolve quality measurement enabled by health IT.

2.1. Challenges to Achieving Health IT-Enabled Quality Measurement Ideals

Health care stakeholders may have slightly different priorities for the near term and mid-term in support of health IT-enabled quality measurements. Despite varied priorities and plans on how to achieve the future state of health IT-enabled quality measurement, stakeholders agree on the possibilities for health IT-enabled quality measurement. This results in some unresolved infrastructure challenges, gaps in the measure set, and a lag in the achievement of the promise of technology. For example, infrastructure challenges in a fragmented delivery system may pose challenges to the advancement of specific patient-focused measures. Disagreement on which measures are of greatest priority to pursue and the remaining pockets of low technology adoption can also slow progress. Such challenges can inhibit the effectiveness of using health IT to measure the quality of care. Moreover, key communication challenges also exist; better engagement and exchange of ideas among quality measurement stakeholders is needed to address many of these key challenges. Patients and their families are key members of the health care community and must also be engaged as both contributors and users of quality information. While these challenges may be disconcerting; these different priorities also offer opportunities for innovations to be pursued and large scale advancements to be eventually realized.

2.2. Advancement in Health IT Enables Evolution in Quality Measurement

Until recently, quality measurement relied almost exclusively on the use of electronic claims data, manual chart abstraction, and patient surveys. However, the enormous, recent growth in the adoption of health IT has the potential to enable superior quality measurement. By the end of 2012, approximately 44.4 percent of non-Federal, acute care hospitals in the U.S had adopted at least a basic electronic health record (EHR) system, up from 12 percent in 2009.[5]

During that same time period, adoption of EHRs increased from approximately 22 to 40 percent among office-based physicians.[6] Health information exchange is also advancing; today over 40 percent of hospitals electronically send lab and radiology data to providers outside of their organizations.[7]

The National Quality Strategy. Section 3011 of the Affordable Care Act called for a National Quality Strategy (NQS) to be established to improve the delivery of health care services, patient health outcomes, and population health. This strategy, developed by AHRQ iteratively and collaboratively with numerous public and private stakeholders, is guided by three aims: Better Care, Affordable Care, and Healthy People/Healthy Communities. The NQS has six priorities that can, in part, leverage the benefits of health IT-enabled quality measurement, including engaging patients as partners, promoting communication and coordination of care, promoting best practices, and empowering new health care delivery and payment models. Several implementation activities have already taken place and collaboration for upcoming activities is ongoing.

This progress is partially attributed to two recent pieces of legislation, which focus on the need to improve health care quality and contain health care cost growth: the American Recovery and Reinvestment Act of 2009 (ARRA) (Public Law No 111-5) and the Patient Protection and Affordable Care Act (ACA) (Public Law 111-1480). These laws have called for new approaches to cost and quality and have helped drive the development of the quality measurement enterprise and the adoption of health IT. ARRA contained the Health Information Technology for Economic and Clinical Health (HITECH) Act, requiring the government to take a leadership role in encouraging the meaningful use of health IT, which has increased the expectations for EHR functionality, including quality measurement. ARRA also funded the Beacon Community Program, which was designed to support health IT infrastructure and the development and expansion of health information exchange.

ACA contains many provisions that address quality and quality reporting. For example, ACA extended CMS' Physician Quality Reporting Initiative (PQRI)—which soon after became the Physician Quality Reporting System (PQRS)—and incentives through 2014; called for the creation of a National Quality Strategy; and initiated several quality programs, including the Hospital Value Based Purchasing program, the Hospital Readmissions Reduction Program, and the Medicare Shared Savings Program for Accountable Care Organizations (ACOs). ACA also gave new responsibilities to the Center for Quality Improvement and Patient Safety within AHRQ and the Center for Medicare and Medicaid Innovation (CMMI) within CMS to test new payment and health care delivery mechanisms. These new and extended programs hold the expectation that new payment models will drive the demand for improved quality measurement and that quality reporting will be enabled by health IT to a greater extent over time.

Accountable Care Organizations. Affordable Care Act Section 3022 called for the establishment of the Medicare Shared Savings Program, which was launched in November of 2011. This program aims to facilitate coordination and cooperation among providers to improve the quality of care for Medicare Fee-For-Service (FFS) beneficiaries and reduce unnecessary costs through Accountable Care Organizations (ACO). Since passage of the Affordable Care Act, more than 250 ACOs have been established and as of January 2013, 106 ACOs have been selected to participate in the Shared Savings Program, collectively covering more than 4 million Medicare beneficiaries. As the program is refined, health IT-enabled quality measurement could offer new information for both improving care delivery and containing costs in new reimbursement models.

2.3. Ideals for Health IT-Enabled Quality Measurement

There is a great deal of agreement across the literature, RFI respondents, and focus group participants on a number of high-level attributes or components of an ideal future state.[2, 8–12] The following represent some examples of possible characteristics of the further state:

- ***Measurement should be patient centered.*** A key aim of the National Quality Strategy is to "improve overall quality, by making health care more patient-centered, reliable, accessible, and safe."[13] Patients and their families need not only to have access to clear and useful performance information data to participate in choosing providers and treatments but also to be considered valuable contributors of data to support the creation of patient-centered quality measures.

- ***Measurement should be supported by end users' education and collaboration.*** The development of quality measures is an active team-effort. Collaboration is continually needed at every stage in the development cycle to ensure effective and efficient measurement. In addition to collaboration, a common understanding of the broader context of quality measures is needed by measure developers, generators, reporters, and end users so that measures derived for one use do not inadvertently impact the interpretation of the quality measure if taken out of context and used for other purposes.

- ***Measurement should be aligned to national priorities.*** Although there is less consensus around the extent to which the measure set should be broadened or narrowed, there is agreement that measures should be aligned across public and private programs to reduce burden. Furthermore, value—quality in relation to the cost of care—has been suggested as an overarching goal that could unite the interests of diverse health care stakeholders.[14,15]

- ***Measurement should be actionable and built to work within a system of quality improvement.*** Meaningful measurement needs to be actionable for the end users (e.g., patients, providers). Additionally, quality measures should be used to generate clinical decision support and create actionable alerts that can be used at the point of care.

- ***Measurement should leverage available technologies.*** In the desired future state, automation is increased and significant additional effort to manually extract data for measurement is eliminated. New tools enable providers and patients to contribute to and use measurement information in new ways.

3. Reflections: Perspectives, Pathways, and Practical Guidance

eIMPROVEMENT

The primary goal of quality measurement is to improve health care outcomes. Throughout the stakeholder engagement activities, the long-term vision for quality improvement remained consistent: health-IT enabled quality measurement must support eImprovement. Stakeholders suggest that cycle times for quality improvement can be reduced, as meaningful, actionable information becomes available to decisionmakers (e.g., patients, families, and clinicians) in real time or near real-time for care management. System-wide information could also be available for payers, providers, and purveyors of public health through the accurate and efficient use of technology. In other words, stakeholders would like to see measurement move beyond "checking the box" to meet program requirements and evolve into measurement that is actionable and timely for patients and providers and can improve care.

This chapter provides a discussion of perspectives, pathways, and practical guidance for advancing health IT-enabled quality measurement from the RFI responses and focus group discussions. The specific insights sought regarding the 15 substantive RFI questions are discussed in Appendix A. Additionally, Appendix A contains a summary of the subsequent stakeholder-specific discussions, which illuminated specific areas of interest such as: importance of risk adjusted rates, clinical decision support at the point of care, necessity of health information exchange, and so on.

3.1. Perspectives on Health IT-Enabled Quality Measurement

In the name of quality improvement, the U.S. health care system is simultaneously trying to accelerate the development of new measures, make the best use of health IT, and incentivize improvements in the way care is delivered.

Despite their common commitment to advancing health IT-enabled quality measurement, stakeholders vary on the degree to which they find it necessary for quality measurement to instigate system-wide innovation given the concurrent changes to the health care systems, processes, and resources. Using the three-legged stool as an example (i.e., intended objective, resources available (time and money), and change anticipated), stakeholders seek to find balance among these three when choosing to pursue such enhancements. Often, there is desire for greater scope (i.e., increased specificity, volume, or complexity in information generated and reported) without comparable resources, which leaves the stool unbalanced.

The tradeoffs between perspectives was illustrated by an RFI respondent, "Consumers and purchasers are most interested—in many cases—in the directionality of measures, and are less concerned with creating the 'ideal' specifications with the exact exclusionary codes, etc. The mentality [of limiting measurement to "ideal" specifications] delays the development of meaningful measures. This mentality also may result in measures of patient experience, engagement, and outcomes that use patient-reported data being subject to greater scrutiny than other types of measures."

During the analysis of RFI responses and focus group discussions, patterns emerged from the diversified respondents as to how activities in pursuit of health IT-enabled quality measurement should be prioritized. These perspectives conceptually frame the relative priorities of how some stakeholders would like to proceed (see "Perspectives on Health IT-Enabled Quality Measurement" on page 8). For the purposes of this discussion these perspectives were simplified as: quality measurement accelerating systemic quality improvement as the highest priority, measurement maximizing current capabilities of health IT, measurement relying on the current capabilities of a given delivery system, and a centralized prioritization of measures where tradeoffs in these perspectives are explicitly managed. These perspectives are presented as an opportunity to facilitate dialogue; frame how various stakeholders are phrasing their desires, priorities, and needs; and help inform the deliberative process. A number of key areas for improvement were discussed by RFI respondents and focus group participants. At a high level, there appeared to be agreement about the importance of addressing challenges in these areas. However, despite high-level agreement on the importance of making progress in each of these areas, there were often diverging thoughts on how to approach and operationalize solutions based on stakeholders' perspectives on the acceptable level of changes to information systems and care processes that could be induced by quality measurement. New measures to support key areas cited by RFI respondents, focus group participants, and researchers (e.g., care coordination, specialty care, functional status, patient reported outcomes, patient experience, longitudinal measures) could be implemented as part of a broader change to care delivery, but the timing matters. If the measure is introduced before the care delivery change is fully implemented, the measure serves as an accelerant. If the measure is introduced after the change is implemented then the measure provides a yardstick for progress. Some respondents and stakeholders viewed using measurement as a tool to accelerate change as positive, while others viewed the same approach as a negative disruption. Still, others acknowledge the need for some disruption but believe that the degree of disruption should be centrally managed through a broad consensus process led by either the public or private sector or both.

Each planned incremental advancement in health IT-enabled quality measurement is defined by its—

- Intended objective
- Resources available
- Change anticipated

Perspectives on Health IT-Enabled Quality Measurement

Four perspectives on the prioritization of activities to advance quality measurement enabled by health IT emerged from the various stakeholder engagement activities (e.g., RFI, focus groups). The perspectives identified here are simplified for the purposes of discussion; there are many possible hybrids of these perspectives and a given stakeholder may express more than one perspective in different situations. As patient and family engagement increases, such perspectives will evolve and inform the others.

Each perspective has advantages and disadvantages. The purpose of this discussion is to bring forth the underlying assumptions of each perspective to better understand the associated implications for strategies, opportunities, and possible solutions around key topics (e.g., data capture, data access, patient and consumer engagement, measure development, measure testing) as discussed by stakeholders. For example, stakeholders engaged in the collaborative pursuit of new quality measures could perhaps explicitly discuss how priorities might be viewed differently based on each perspective.

The following provides a brief description, in no particular order, of each perspective:

- ***Quality measurement accelerating systemic quality improvement as the highest priority—*** Measurement should be developed for use within identified approach for improving quality. Measures may be used to accelerate innovation in information systems and practices of care to support a future vision of high-quality health care delivery. Thoughtful consideration should be given to appropriately harmonize and align quality measures across programs. Moreover, burden and impact should be carefully considered, but measures should not be limited to the capabilities of current care delivery or health IT systems. Measures should be aggressively developed to optimize use for various stakeholders and purposes, recognizing the measurement needs of clinicians, institutions, patients, government, and other public health and reporting entities.
- ***Quality measurement maximizing the current capabilities of health IT—***Measurement should leverage all currently available health IT (e.g., EHR, registries) needed, but constrain measure specification to information that could reasonably be assumed to be generally available and widely accessible to minimize implementation burden. New measures should be designed to be feasible today. Measure development can evolve as new data becomes available. Measures for public health and public reporting would be limited to measures that are readily available from current information systems.
- ***Quality measurement relying on the current capabilities of a given delivery system—***Measurement should be a byproduct of care delivery and seek to minimize impact on clinician workflow. Measure specifications should be constrained to information that would reasonably be needed to support care. Measures for public health and public reporting would be limited to measures that can extract data collected in the course of providing care. Measurement as a byproduct of care may become more inclusive over time as quality measurement and improvement are integrated into clinical training across specialties.
- ***Centralized prioritization of measurement, balancing perspectives—***New measure development priorities should be driven by an authoritative entity through declarative means and tradeoffs in the above perspectives are explicitly managed. Quality measurement programs should be aligned and harmonized uniformly through a centralized multistakeholder process.

Additionally, the objectives for advancements may differ as well. For some, the focus is near term with more definitive impact (e.g., EHR certification, reporting). While others are ready to embrace a more comprehensive system of quality improvement and consideration of how health IT-enabled quality measurement is both informing the health care system and payment models, as well as being informed by them. The objectives reflected in the perspectives could be a function of the level of experience with not only health IT, but also with an integrated quality improvement system. Individuals and institutions may express preference for different perspectives, depending on the particular quality measurement pursued, setting of care, or resources available to support the endeavor.

At times, there can be hard to recognize and mutually exclusive desires and even divergent strategies regarding agreed upon priorities for short-term actions and long-term plans. Given the complexity of the systems and the number of factors in flux at any one time, it is often difficult to operationalize values for each of these three dimensions. Through the implementation phase, as adjustments are made (chosen or de facto), the overall balance of realized objectives, applied resources, and change tolerated, may be modified. There is no one way or "right" way. Yet, understanding the breadth and interconnectedness of these actions is important. Clearly, "incremental" advancements do have system-wide impact, directly and indirectly.

3.2. Pathways to Enhanced Quality Measurement

The following sections discuss five key topic areas (measure development, implementation, and testing; data elements and data capture; data access, sharing, aggregation, and integration; patient engagement; and collaboration and education) identified by RFI respondents and focus group participants as critical areas for improvement to advance health IT-enabled quality measurement. Thematic reflections and recommendations for action are articulated for each topic. A full list of recommendations can be found in The Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement. Wherever divergent stakeholder views appeared to be related to the four simplified perspectives articulated above, the discussion calls out any potential differences in priorities that may be expressed as a result of the perspectives.

3.2.1. Measure Development, Implementation, and Testing

RFI respondents and focus group participants frequently discussed the measurement development lifecycle and some of the associated challenges and concerns that arise at various points of the lifecycle as they relate to quality measurement enabled by health IT. Collaboration is a key tool that many of the stakeholders indicated as critical at every stage of the lifecycle. Collaboration is discussed separately in this chapter because of its importance for all aspects of quality measurement enabled by health IT.

RFI respondents and focus group participants indicated that improved specification for quality measures is needed to ensure more effective implementation. The implementation process for new measures can variably increase measurement burden, particularly on providers and vendors. Stakeholders recommended collaboration as critical throughout the lifecycle to ensure that implementation burden is considered during the measure development phase. Many of the stakeholders who responded to the RFI or participated in the focus groups also emphasized the importance of automation to reduce measurement burden, suggesting that collaboration with vendors be improved. Vendors expressed the need for their active engagement with clinicians and recognized that meaningful engagement of patients both as providers and even verifiers of health care data as well as users of quality measurement reporting were underutilized. Moreover, provider focus group participants recommended that measure development should be aligned with the EHR certification program. There was also concern that variation occurs when vendors implement the same measure in different sites due to differences in workflow and other factors.

Many participants encouraged the government to facilitate further the sharing of information and guidance on the "how to" strategies.

> In January 2013, ONC and CMS hosted a Kaizen event that focused on making the eMeasure development process more efficient and effective. The event resulted in cross-contractor, cross-agency, and cross-stakeholder collaboration across the clinical quality measure enterprise. Workgroups focused on each stage of the lifecycle and were able to identify specific, actionable steps to improve the eMeasure development process. Additionally, workgroups have continued the work begun in January, 2013, and are piloting efforts that address some of the same issues brought up by RFI respondents and focus group participants.

Testing was another key part of the measurement lifecycle that RFI respondents and focus group participants discussed improving. Some providers and vendors suggested that testing should begin while measures are in the development stage and should not be rushed. Measure developers expressed need for a more standard measure testing methodology, additional funding for testing, and more expansive test sites. Moreover, focus group participants across stakeholder groups suggested that there is a lack of best practices for testing in both scope and scale of measure testing.

RFI respondents and focus group participants noted that measures should be re-evaluated regularly to determine whether the measures are fulfilling their intended purpose. Stakeholders also recommended that further research is needed to test the reliability of chart abstraction versus EHR generated quality measures. The Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement contains a full list of RFI respondent and focus group participant suggestions.

Stakeholder perspectives on approaches to measure implementation vary. Although stakeholders generally agreed about the importance of measures across care settings, those who feel that new measure development should be constrained to current health IT and delivery system capabilities may prioritize development of measures that are easier to implement as opposed to measures that require further action on the part of providers and their staff. However, stakeholders more aligned with a desire to leverage innovation may prioritize measures such as across care settings, if they conclude the measures are important to improving care quality despite potential implementation burden.

3.2.2. Data Elements and Data Capture/Tools to Process Unstructured Data

Producing highly reliable and valid quality measures that are appropriate for high-stake uses (e.g., reimbursement) requires clear measure specifications that accurately anticipate the availability of high-quality data. The supply chain for quality measure data is complex, hinging on both technology (e.g., user interfaces, data stores, data capture technologies) and processes (e.g., clinical workflow, data validation processes). Rapid introduction of changes in care delivery, the variability in EHR vendor applications and implementations, and the increased depth of clinical information available make data access and reliability issues particularly challenging at this point in time. Accordingly, RFI respondents and focus group participants cited data quality as a major barrier to eMeasurement. They cited inconsistencies in the scope of data elements captured in various health IT systems, frustration with increased requirements for data entry, problems with user interfaces, difficulty in retrieving data from various systems, and imprecise measure specifications as challenges.

Given the expectations for data reuse (i.e., using the same data for a purpose other than the primary data function), it is likely that inconsistencies or erroneous entries at point of capture are carried downstream as well. RFI respondents and focus group participants discussed the importance of consistent, complete, and accurate data capture and developing mechanisms to process unstructured data effectively.

The Regenstrief Institute and the International Health Terminology Standards Development Organization recently announced that they have signed a long-term agreement to begin linking their health care terminologies—Logical Observation Identifiers Names and Codes (LOINC) and SNOMED CT. This collaboration will provide users with a common framework for using LOINC and SNOMED CT.

The importance of standardization was frequently mentioned by RFI respondents and focus group participants. Representatives of providers, vendors, and measure developers all stated a need for standardization of measure specifications, data elements included in measurement, and the process to capture those data elements. Consistency of data capture was discussed as both a data entry issue and a workflow issue; stakeholders are interested in tools to ease data entry. Focus group participants suggested that more consistency is required within vendors' EHR platforms and that perhaps there should be incentives for vendors to build data standards into their products. However, many participants suggested that a standardized EHR user interface was unlikely to be developed because of the competitive nature of the software industry. RFI respondents that have participated in measure development recommended the continued use of tools such as the Measure Authoring Tool (MAT) and the Quality Data Model (QDM) for standardized eMeasure development; however, they suggested further refinement of these tools particularly in the ability to support development of longitudinal measures. RFI respondents and focus group participants also indicated that while the National Quality Forum (NQF) requires eMeasure developers to use QDM data elements, current EHRs generally are not designed to support the QDM, complicating attempts for standardization.

Stakeholders frequently expressed a need for consistency in measurement of similar concepts (e.g., tobacco use or cigarette use) so that measure results are comparable across programs. The U.S. Health Information Knowledgebase has a Standards Portal, which can be used to research, review, and compare metadata between different Standards Developing Organizations.[16] Additionally, NQF has adjusted their consensus review process to attempt to harmonize measure concepts, with limited success. There was recognition that common measure specifications may not be sufficient for comparability. Alignment down to the level of data capture and data storage may be required. Both data capture and data storage need to be tested for comparability at the measure implementation level, where few tools exist.

"The balance between structured and unstructured data in an EHR is a difficult one, since it represents a trade-off between flexibility and standardization."

Natural language processing was suggested as a potential tool to reduce the requirement for standardized data entry, to validate measures, to identify patient inclusions and exclusions which may rely on information that is captured in text in many parts of the health record, and to assess the reliability of free text; however, some respondents expressed concern about relying on natural language processing for measurement purposes.

> ***"To improve consistency in data capture, we have to focus on the critical data elements."***

Focus group participants suggested that an evidence-based report should further examine the potential use of natural language processing for quality measurement. (See call out on this page to learn more about providing additional recommendations for this topic or submitting a new topic to AHRQ). Other potential tools that focus group participants discussed include voice translation technology and qualitative data analysis software. RFI respondents and focus group participants suggested that further research is needed to determine the best utilization of tools designed to handle unstructured data for the purposes of quality measurement.

Reliability of data is an issue that extends beyond EHRs. Both RFI respondents and focus group participants stressed the value of data from sources other than the EHR. Frequently mentioned sources included registries, lab and radiology systems, public health databases, payer information systems, and patient generated data. For each data source, a more stringent evaluation of the consistent capture of data was also noted as an area for improvement.

Approaches to improving the quality of data used in measurement can vary based on the participant's and respondent's perspectives on the role of measurement in inducing change. NQF suggests that all eMeasures being considered for endorsement use only data elements that are included in the QDM. Some RFI respondents and focus group participants also discussed the burden of data capture on providers and their staff and suggested that the value of any new data elements should be explicitly assessed. Some respondents advocated that measures rely solely upon data elements that are already required to support the care delivery process. Alternatively, those more comfortable with using measurement to push innovation may conclude that a particular measure is so important that it should be implemented even if additional new data elements are needed, new system developments are needed, or provider burden is increased. Additional suggestions from the RFI respondents and the focus group participants can be found in the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement.

Based on stakeholder recommendation, AHRQ encourages coordinated end user submission for potential systematic review to be conducted about the use of Natural Language Processing and Health IT-Enabled Quality Measures

As ever, AHRQ welcomes end user's nominations for systematic reviews for topics of interest. Nominated research questions for a given topic that are informed by diverse end users who are committed to be disseminating partner organizations, will be prioritized. For selected topics, research questions will be refined with further input from stakeholder groups (e.g., guideline developers, policy-makers, clinicians, patients).

Nomination forms are available on AHRQ's Effective Health Care Program Web site.

The most effective nominations provide specific information. For expository purposes, some examples are shown about acute infections and patient safety.

- Identify the areas of controversy (e.g., what are the benefits and harms?).
- What is the population of interest (e.g., for known asymptomatic carriers)?
- Is there a standard comparison (e.g., versus standard contact precautions [glove and gown for contact])?
- What are the important outcomes (e.g., to reduce infection incidence)?

3.2.3. Data Access, Sharing, Aggregation, and Integration

In an effort to achieve data liquidity between systems and vendors the "CommonWell Health Alliance" was recently launched. This new vendor alliance represents 41 percent of the hospital EHR market and 23 percent of the ambulatory care EHR market. Initial participants include Cerner, McKesson, Allscripts, athenahealth, Greenway and RelayHealth. Per a press release, the Alliance will define, promote, and certify a national infrastructure with common platforms and policies.

The issues of data access, sharing, aggregation, and integration are particularly important to quality measures aimed at comprehensive, patient-centered care. Health information exchange is critical for many of the quality measures that RFI respondents and focus group participants have indicated are needed (e.g., longitudinal, episodic, patient-reported outcomes).[7] RFI respondents and focus group participants indicated that it is critical that barriers around data access, sharing, aggregation, and integration be lowered in order to enable better quality measurement. Respondents to the RFI and focus group participants expressed an interest in expanding data sources for measurement to include, for example, claims systems, registries, pharmacy systems, and laboratory systems. Payers, in particular, indicated that they would use for quality measurement "all data made available to them."

"There is a need to think from a different point of view. It's not just about what data lives in an EHR…there is a bigger data set we need to think about."

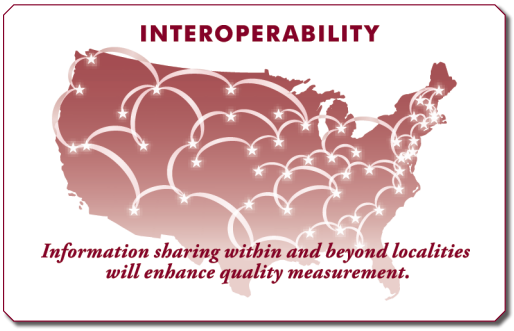
The lack of health IT adoption across all settings of care concerned some RFI respondents and focus group participants.

A recent ONC report indicated that only 25 percent of hospitals and 31 percent of physicians could exchange clinical summaries with outside providers.[7] Moreover, the report indicated that exchange is even more limited for long-term and post acute care settings.[7] Lower adoption in nonacute settings, such as skilled nursing facilities, could limit the electronic data available to support quality measures for some of the most vulnerable populations. The absence of electronic data would delay the development of new measures. More broadly, there are increased concerns about data consistency and data quality across sites of care. One focus group participant asked, "Who is the source of truth if data is in conflict [when data is shared]?" Focus group participants suggested that proprietary code among vendors and the need for funding and testing of aggregation tools are also challenges to data access, sharing, aggregation, and integration.

"The most challenging issues anticipated [in terms of data aggregation and integration] are around policy, privacy, governance, and data ownership…the technology is pretty straightforward."

Stakeholders generally agreed that data sharing, aggregation, and integration are more hampered by policy issues than they are by technology issues. One example provided by a focus group stakeholder was the lack of "model policies" so that local policies could more easily be replicated across communities. Specific policy issues discussed by stakeholders include the need for strategies to address sensitive information and the need for shared accountability for shared information.

Many of the RFI respondents and focus group participants agreed that patient identifiers are critical for linking data across multiple sources;



however, focus group participants indicated that they believed it would be unlikely that a national patient identifier would be implemented in the near future. One participant noted that the health information exchange and data sharing efforts that have been most successful have used some sort of common identifier. While participants agreed that common patient identifiers were important, the urgency to address that challenge is mitigated by the extent to which pertinent data from non-affiliated health care providers are available.

RFI respondents and focus group participants discussed a number of possible solutions to addressing issues around data access, sharing, aggregation, and integration; the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement contains a full list of suggestions. For example, standard data definitions and data elements would ease some of the technological challenges to data aggregation. Additionally, new tools for data aggregation and integration would be advantageous. Stakeholders reinforced the importance that model policies and constructs be robustly tested and feasible solutions provided before policy changes are in place.

Stakeholder perspectives on the priority for advancement and acceleration of health information exchange vary. If a stakeholder felt that a global, patient-centered outcome measure was very important to advance quality, then advancement of health information exchange would be seen by that stakeholder as imperative, particularly if health information exchange can facilitate the integration of outside data, which may reduce provider data collection burden by increasing automation and reducing duplicative efforts. However, other stakeholders feel that there is sufficient opportunity for improvement using data that exists in single sites of care, and might emphasize new measures that improve care without relying on an enhanced infrastructure for information exchange.

Health Information Exchange

The ability to exchange clinical information between health care entities creates new opportunities to improve patient safety, care coordination, and quality measurement and improvement. Health information exchanges (HIEs) throughout the United States are facilitating information sharing.

The Indiana Health Information Exchange (IHIE) is the Nation's largest HIE, connecting more than 90 hospitals and 110 clinics and surgery centers across Indiana and more than 25,000 across 17 states. IHIE uses a statewide network called the Indiana Network for Patient Care (INPC) to provide a "virtual" longitudinal patient record. The INPC handles over a million secure transactions a day, including 3 billion pieces of clinical data, 80 million radiology images, 50 million text reports, and 750,000 EKG readings. It enables all participating sites access to discharge summaries, operative notes, medication records, and pathology reports. In April, IHIE created a for-profit subsidiary to generate additional revenue towards self-sustainability. In May, IHIE launched the Quality First Web site, offering quality information across to 22 measures.

3.2.4. Patient Engagement

Patient engagement—which is inclusive of the engagement of families and caregivers in the care of patients—was frequently suggested by stakeholders as a means by which to improve health outcomes. It is frequently stated that **patient engagement is the blockbuster drug of this century.**[17]

Ensuring that each person and family is engaged as partners in their care is one of the National Quality Strategy priorities and is among the Meaningful Use requirements. Stakeholders who responded to the RFI or participated in the focus groups frequently discussed the importance of patient engagement and how it relates to quality measurement enabled by health IT. Moreover, respondents and participants discussed the importance of patients as both users of quality information and providers of quality information to be fully engaged. Focus group participants suggested that patient engagement in quality measurement can lead to shared decision-making and can enhance successful patient-provider relationships. Despite its value, participants noted that the intersection of patient engagement and quality measurement can be challenging; patients, families, and caregivers are not often effectively engaged in conversations around quality measurement. Measures do not need to be of equal importance to all users of quality measures; however, the value to the end users and their means to benefit by that information need to be transparent. There is a need to better understand what measures are of most interest and value to patients and the most effective means by which patients, families, and caregivers can interact with measures.

> ***"When [patients, families, and their caregivers] are involved and the measure is directly relevant to them…measurement becomes more meaningful."***

Many RFI respondents and focus group participants (including participants from patient advocacy organizations) discussed the lack of existing quality measures that matter most to patients, families, and caregivers. Such an expansion of measures may signal a change in what constitutes a quality measure, beyond assessments of the actions of clinicians and the health care system.

The development of new types of measures, whose purpose could be to assist patients in their ability to manage their own health, could inform the health care system in general. Current measures are primarily designed for clinicians or oversight organizations; however, measures designed to engage patients in their care must consider that patients view quality differently than clinicians. Stakeholders stated that patients are looking for quality information particularly at two points in time: when choosing a physician or provider and when choosing treatment options for their illness or condition. Several focus group participants recommended research to further identify the needs of patients and determine how to translate those needs into useful measures. Often patients and families are not sure where to go for quality information until the need arises. Some focus group participants recommended that tools for health care quality could be marketed in advance, so that patients would know where to get information if needed as is common in other industries (e.g., OpenTable in dining, TripAdvisor for travel). When choosing a physician or provider, stakeholders suggested that patients would be interested in information about location, cost, and value (i.e., price in relation to quality). Additionally, patients want to have a provider rating focused on offering treatment options, a provider rating focused on working as part of a team, and a provider rating focused on success treating patient's specific conditions. A need for personalization was a consistent theme. When considering treatment options after a diagnosis is made, stakeholders suggested that patients want to know how various options for care have resulted in improvements in patients similar to them.

> ***"The challenge is that you cannot design [public reporting of quality information] for a patient…you have to design it with them."***

Once in treatment, stakeholders indicated that patients want information around how they are progressing against benchmarks or against their own goals. Furthermore, it was recommended that personal goals may need to be integrated with clinical goals.

Blue Button, which enables patients to download their personal health information from online accounts, is currently available to Veterans, uniformed service members, and Medicare beneficiaries. Almost 1 million people have downloaded their own health information via Blue Button. Many private sector companies such as UnitedHealthCare and Aetna are also providing a way to "Blue Button" or download their health data for their members or beneficiaries.

RFI respondents and focus group participants indicated that information presentation must also be considered; information currently available to consumers today is often disorganized, incomplete, and of variable reliability. Patients were reported to not have confidence in many of the current sources of information (e.g., online opinions, payers). Presentation must be easy to understand; for example, some consumer focus group participants stated patients feel that discharge summaries are not well-received because they contain too much information and are not easily understood by patients without assistance. Focus group participants suggested that some information might require complimentary education from a provider to be valuable, while other information should be accessible and presented in ways in which the patient and/or family member can understand without assistance.

Post acute care (e.g., skilled nursing, home health care, hospice) was recommended by focus group participants as a potential environment in which to pilot and test new patient-centered measures, ways of presenting and collecting information, and various tools for engagement of patients and families. Post acute care provides the opportunity to evaluate patient care episodically, examine an expanded care team, test a wide variety of measures, and review the use of measurement in a variety of care settings and across the care continuum.

RFI respondents and focus group participants discussed a number of different tools and additional research that may be needed to better engage patients as users and contributors of quality information. Technologies such as personal health records (PHRs) and patient portals were suggested to assist in better integrating patient-reported information with other clinical data. Stakeholders also recommended that familiar platforms such as tablets, kiosks, and mobile devices be placed in frequently accessed areas (e.g., doctor's offices, pharmacies, grocery stores) to engage consumers. Focus group participants suggested that systems to encourage patient contributions of data need to be less cumbersome with minimal manual entry.

"It is not so much that all voices are not heard, but they are not heard in the same place."

Moreover, systems supporting patient-reported data should be intuitive and relevant. Stakeholders recommended that further conversations with consumers should focus on how and why patients might use quality information, as well what information interest patients and how they would like to see it presented. Several organizations were noted as conducting additional research and pilots in this area, such as The Informed Medical Decisions Foundation, the Centers for Aging Services Technologies, and the Cleveland Clinic, which have been included in Appendix C.[18] Focus group participants indicated that further research is needed to determine the best mechanisms for presenting information to patients. Moreover, these technologies and the way information is presented should be designed with patients to ensure that they are effective. Additional recommendations around patient engagement can be found in the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement.

3.2.5. Collaboration and Education

RFI respondents and focus group participants, regardless of stakeholder group or affiliation, emphasized the need for collaboration and education as mechanisms for improving quality measurement enabled by health IT. Stakeholders involved in the development, implementation, and use of health IT-enabled quality measures include measure developers, IT vendors, providers, payers, researchers, patients and families, and many others. Given the variety of stakeholders that are engaged in these activities, collaboration may take numerous forms. RFI respondents and focus group participants frequently mentioned the importance of communication among these stakeholders to address the challenges associated with data elements and capture, data access and sharing, measure development and testing, and patient engagement.

Collaboration among all stakeholders was identified as important; however, RFI respondents and focus group participants suggested that vendors and measure developers, in particular, should engage each other early in the measure development process and work together throughout the measurement lifecycle. However, focus group participants recognized that with limited resources, consistent and regular engagement throughout the measurement lifecycle can be a challenge. RFI respondents and focus group participants indicated that consumers (i.e., patients and their families) and employers must also be a part of the collaboration; however, it was suggested that engaging these two groups can also be challenging, due to a lack of resources. Further, focus group participants cautioned that patients and employers may have differing interests and should not be uniformly considered substitutes for one another.

RFI respondents affirmed the importance of "incorporating the science of health care delivery and quality measurement" into provider education. Additionally, one RFI respondent noted that many specialties require quality reporting and improvement activities in the board recertification process. RFI respondents further indicated that education for stakeholders is crucial throughout the measurement lifecycle. For example, it is important to demonstrate to providers that health IT-enabled quality measurement leads to improved care for patients and economic practice enhancement. RFI respondents and focus group participants recommended a number of different forums for education of stakeholders (e.g., continuing medical education courses and Webinars for providers, town hall meetings and online forums for patients). Additionally, it was suggested that the development of educational tools are further needed. For example, focus group participants recommended that a resource which summarizes vendor capabilities for measure development would be very useful to measure developers. Programs for consumers and purchasers are also needed to provide education on what quality information is available and how it can be interpreted.

It was frequently recommended by RFI respondents and focus group participants that the Federal Government may be the best suited stakeholder to convene diverse groups. These individuals suggested that large-scale, national collaboratives are the best mechanisms for engaging a variety of stakeholders. However, the goal for any such collaboration or education activities needs to build a foundation that could be continued beyond an initial meeting. Collaboratives or educational programs that are tied to national level programs or initiatives may have greater interest among stakeholders.

Workshops would need to be broad enough with meaningful content to attract diverse stakeholders and to compete with the many other conference offerings available. Possible topics recommended for discussion included role definitions, common vocabulary, issues with data elements, measure testing, and challenges in development and implementation. Additional recommendations around collaboration and education can be found in the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement.

3.3. Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement

The following table (Exhibit 1) contains ideas that were presented by stakeholders who responded to the RFI or participated in focus groups. This list is not meant to be directive, but simply to describe the recommendations made by stakeholders and provide prospective, practical guidance (Appendix C) contains examples of existing activities, which provides retrospective, practical guidance). Specific questions were asked in the RFI; the responses to those questions informed the customized content pursued in the stakeholder-specific focus groups. Responses tended to coalesce around particular themes. Since the questions asked during the focus groups were driven by the RFI responses, the activities and topics in this table are also mapped back to the associated RFI question. Notation is made regarding whether the activity was suggested in RFI responses, during focus groups, or both. The fact that a recommendation was not made by RFI respondents may merely be a function of the selected focus of the RFI respondents' responses to purposefully open-ended RFI questions. Similarly, a recommendation not mentioned by focus group participants may be attributed merely to the limited time available for each of the focus groups. Conversely, it should not be assumed that all participants agree with each recommended activity or action. Some items mentioned during focus groups also have a recommended timing; if such prioritization was discussed it is labeled near term or mid-term. Relative prioritization was not discussed in all focus groups and was not asked of RFI respondents. Moreover, in some cases, additional "Reflections" are listed to elaborate on key observations associated with the recommendation.

The suggestions in this table are organized by topic area and correspond with the topics discussed in Section 3.2 of this report. The suggestions are listed in no particular order within each heading. A summary of the RFI and focus group reflections can be found in Appendix A.

Exhibit 1. Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
Measure Development, Implementation, and Testing					
1	Determine the greatest need for new measures or for updating existing measures (i.e., measures that would add the most value) and focus on eSpecifying those measures instead of retrofitting all measures	3		✓	✓
2	Develop new types of measures (e.g., care coordination, specialty, functional status, clinical outcomes, overuse, efficiency, cost effectiveness, variation, value, resource use, readmission measures, shared decisionmaking, longitudinal measures, patient experience, subacute care)	2, 4, 10, 13	NT/ MT	✓	✓
3	Define the purpose for certain measures (e.g., measures for quality improvement, public reporting) so that measures are developed to be consistent with their intended purpose	3		✓	
4	Develop measures that are actionable for patients and providers (and include the appropriate actor), accurate, relevant to consumers and their goals, and tied to reimbursement	2, 4, 10, 13	MT	✓	✓
5	Improve measure specifications so that they improve the usefulness and ability of electronic quality measurement to be feasible, valid, and reliable	7, 8, 13	NT	✓	✓
6	Assess the feasibility and impact of deploying (certain) new measures	2, 4, 10, 13	MT	✓	
7	Evaluate measures currently used for public reporting, their intended purpose, and whether they are really making a difference (i.e., fulfilling their intended purpose)	3		✓	
8	Evaluate measures used for quality improvement (i.e., assess if measurement really improves outcomes) and determine if small variances in what and how we measure changes outcomes	3		✓	
9	Offer financial incentives to motivate measure developers to develop new eMeasures	5		✓	
10	Increase electronic health record (EHR) adoption [Reflection: Many organizations (e.g., post acute care, State-based, mental health, substance abuse, disability) are far behind in the development of such measures due to a lack of technology, which has not been widely adopted largely because of the lack of financial incentives and lack of access to the same technical assistance commonly received by hospitals and other medical systems]	7, 10		✓	
11	Refine the Measure Authoring Tool (MAT) to include making it able to create longitudinal measures	8		✓	
12	Continue to improve and expand the EHR Incentive Program and EHR Certification Program (e.g., include more provider types and specialty-specific requirements, improve testing prior to release) [Reflection: Some providers felt left out of the Meaningful Use program (e.g., nurse practitioners, hospice, home health)]	7, 10		✓	

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
13	Develop measures that can be generated as byproduct of care, are actionable and intuitive, and that represent an understanding of operational and clinical workflows for an efficient generation of quality measures [Reflection: Data collected as a byproduct of care will reduce provider burden and duplicative data entry.] [Reflection: Quality measurement results need to be useful to providers in terms of improving care and meeting provider needs (e.g., improve productivity, sync with workflow, be more user-friendly][Reflection: Providers feel they bear most of the risk and administrative cost of quality measurement programs]	3, 7, 10, 11		✓	✓
14	Ensure that quality measures are evidence-based and that the measurement process is reliable and fair	3, 11		✓	
15	Develop a standardized measure testing process to ensure that the data elements required for measurement exist in the system, that the data is consistently populated, and that the data can be pulled for the purposes of measurement	3, 5, 7, 8, 13	NT	✓	✓
16	Conduct further field testing to test the validity and reliability of the data, the measures, and the measure specifications and then share lessons learned from this testing	3, 5, 7, 8, 13	NT	✓	
17	Conduct further testing of longitudinal measures (i.e., gathering data across systems and settings) as health information exchange adoption increases	3, 5, 8, 10, 13	MT	✓	✓
18	Conduct further testing and demonstrations of natural language processing for use in quality measurement	9		✓	✓
19	Conduct pilots to test the reliability of health IT-enabled outcomes measures using EHRs when compared with measures obtained through chart abstraction	3, 9		✓	
Data Elements and Data Capture/Tools to Process Unstructured Data					
20	Agree on an overarching approach to data elements that will be available for measurements (e.g., those that can be captured through the provision and documentation of care or have been identified by the care process itself, those that focus on elements of patient care, those that inform the delivery of care and/or critical for the accomplishing of patient care, those that are needed for public reporting programs)	3, 7, 9			✓
21	Identify critical pieces of information that need to be added in the electronic record to achieve desired measures [Reflection: The necessary data elements that are needed for measurement but that do not currently exist in systems need to be identified and steps put in place to ensure they are included in future releases and available for use.]	5, 7, 8, 9, 10	NT	✓	✓
22	Determine priorities of data capture beyond what is required for meaningful use and other programs [Reflection: Payer requirements and/or regulation often drives data usage and how it is collected.]	3, 7			✓
23	Identify and remedy gaps in the value set	3, 9			✓
24	Develop curricula and provide training to assist in ensuring data elements are entered properly and consistently	3, 7		✓	✓
25	Develop a "plug and play" approach for eMeasure development that will also facilitate easy updates of measure constructs as needed [Reflection: Quality measures should not be hard coded.]	3, 9			✓
26	Investigate and test the best means by which to codify data in a standard way (e.g., HL7)	3, 9		✓	✓

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
27	Encourage vendors to increase consistency within their own platforms and products [Reflection: Although vendors offer providers the convenience of entering data in different places throughout their systems, measurement modules may only pull from one place; there is often no auto-population of that same data into other modules.]	9, 11			✓
28	Assess where EHRs have the best data versus where the best data can and should be obtained from other places (e.g., registries, patient reported information, mobile monitoring devices)	9, 10, 14		✓	✓
29	Improve the data dictionary and categories of information aligned to meaningful use standards	9			
30	Evaluate the usability of current data elements (structured or unstructured); determine what data is most feasible and useable and enhance that [Reflection: Some structured data is not even useable.]	9			
31	Create a more effective means for EHRs to automatically consume Health Quality Measure Format (HQMF) or substitute [Note: HQMF is a standard for representing a health quality measure as an electronic document, developed by NQF, HL7, HIMA, and Alschular Associates.]	7, 8, 9	NT	✓	✓
32	Provide guidance on how to use templates, Quality Data Model (QDM), etc. to assist in standardizing how information is captured in EHRs [Reflection: A better means is needed to standardize data capture.]	5, 7, 8, 9, 10	NT	✓	✓
33	Gain general consensus from stakeholders on use of higher value data elements (e.g., National Library of Medicine shared value sets)	5, 7, 8, 9, 10	NT	✓	✓
34	Examine tools to incorporate unstructured data into eMeasures (e.g., natural language processing, Atlas.ti)	9	MT	✓	✓
35	Create a common way to represent data across clinical decision support (CDS) and quality measurement in order to be able use the data more effectively	6	MT	✓	✓
36	Increase standardization of data, data definitions, nomenclature, medical terminology, code sets, data submission and exchange methods, and value sets to support more efficient generation of quality measures	9		✓	
37	Develop a more centralized and uniform distribution of value sets, a singular platform for measurement, and consistent development of a measure from multiple sources	9		✓	
38	Increase standardization in specifications, vocabularies, clinical document architectures, data, and data exchange to improve efficiencies in the process of creating and implementing eMeasures [Reflection: It is important to have structured, standard data for measure specification.] [Reflection: Architecture data models, standards, and technologies must support accurate aggregation on longitudinal data across the continuum; this may require data governance plans to ensure maintenance and integrity of the data.]	9, 14		✓	
39	Assess which measures may be more likely candidates for natural language processing (NLP)[Reflection: Natural language processing may have potential in validating measures, identifying patient inclusions and exclusions, and identifying required data that is typically in free text.] [Reflection: Some RFI respondents suggested that psychiatric measures, radiology measures, and pathology measures may be good candidates for NLP but additional research is required.]	9		✓	

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
40	Continue to assess the correct balance between structured and unstructured data in an EHR [Reflection: This balance of structured and unstructured data is a difficult one, since if represents a trade-off between flexibility and standardization.]	9		✓	
41	Create new means and methods to improve data quality, particularly if data will be reused downstream	10		✓	
Data Access, Sharing, Aggregation, and Integration					
42	Connect EHRs, personal health records (PHRs), other clinical data sources (e.g., registries, laboratory data, vital records, patient entered data, home health care and long term care data, device monitoring data) and administrative data sources via HIE in order to properly integrate bidirectional information needed for electronic quality measurement	3, 7, 10	NT/ MT	✓	✓
43	Remove barriers to data sharing by resolving issues around privacy, sensitive information, governance, and data ownership. Offer model policies that can be implemented by others [Reflection: Policy is the primary challenge in data sharing, not technology.]	14		✓	✓
44	Establish common patient identifiers within localities to track patients across systems and care settings for care coordination and patient safety [Reflection: Although a National Patient Index is not necessary, there needs to be some means to track patients. HIEs that have succeeded have a master patient index to cross organizational boundaries. Some have used mobile phone numbers.]	14		✓	✓
45	Continue to encourage EHR adoption [Reflection: Many providers, especially in post acute care settings, still do not have EHRs.]	10, 14		✓	
46	Use meaningful use as a lever to improve data integration, aggregation, and sharing; consider a third track which will encourage providers to develop and test new concepts such as model policies or new constructs	14			✓
47	Facilitate a common understanding and rules around data sharing and data ownership	3, 7	NT	✓	✓
48	Develop interfaces to extract meaningful clinical data and solutions that aggregate data across a longitudinal record providing a "one-patient" view	14			✓
49	Continue to resolve technical challenges with interoperability.	10, 14		✓	
50	Design and develop new rules engines to extract data from EHRs, integrate data with other sources, and present quality information at the point of care	14		✓	
Patient Engagement					
51	Better engage patients, families, and caregivers in conversations around measurement; offer town hall meetings, online forums, PHRs, or portals to facilitate consumer engagement (including better engagement with their providers)	2, 4		✓	✓
52	Determine and implement a means by which to directly ask patients/consumers what information they would like to have for shared decisionmaking (i.e., what do they want to know?) [Reflection: Consumers' views on quality are different than clinicians; quality needs to also be defined through the eyes of patients and how they want/need to use information.]	4			✓
53	Identify the most effective tools (e.g., kiosks, Web sites/tools, PHRs/portals, mobile) and channels (e.g., faith-based organizations, employers, magazines) for presenting information to consumers that is of value to them	2, 4	MT		✓

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
54	Provide quality information consistent with what patients and consumers want and need to know in order to make decisions. [Reflection: Patients want to know how to select the right provider for their condition, how to evaluate the quality and value of care they receive, how they are progressing against benchmarks, whether their doctors are speaking to one another, etc.]	4			✓
55	Provide quality information in formats that can be easily understood and useful for decisionmaking. [Reflection: Information is currently disorganized and incomplete, if available at all.]	4			✓
56	Involve patients/consumers in the process of designing how information will be presented to them [Reflection: Tools and interfaces need to be designed WITH consumers, not as others seek to design with consumers in mind.]	2, 4			✓
57	Educate consumers on why quality measurement is important and how it can benefit them	4			✓
58	Determine the information that could be collected from patients that will be most helpful for patient decisionmaking and/or most positively impact health outcomes	2, 4	NT		✓
59	Identify the most effective means by which to capture and integrate patient reported information	2, 4	MT		✓
60	Increase consumers' ability to contribute quality information through various technologies (e.g., patient portals, PHRs, interactive mobile devices, telehealth)	4		✓	✓
61	Implement the CAHPS® family of surveys more widely with the government's help	4			✓
62	Collect personal goals from patients/caregivers and integrate with clinical goals	4			✓
63	Personalize existing measures for consumer use in decisionmaking	2, 4	MT		✓
64	Assess the feasibility of a central source or endorsement process for publically available quality information	2, 4	MT		✓
65	Provide information to patients/consumers both on the macro (clinician-specific) and micro (disease- or episode-specific) levels. Sometimes patients/consumers want information about a given provider (e.g., quality, cost, and location), but it may also be valuable to know how a provider performs in treating a certain disease	4			✓
66	Use meaningful use information (e.g., Dr. X has an EHR, reports quality information, is part of a patient centered medical home (PCMH) as a means by which to provide valuable information to patients/consumers	4			✓
67	Increase patient access to different types of information and provide a means by which patients/consumers can better understand the information presented to them [Reflection: Consideration must be made for patients' ability to access and understand their own data.]	4			✓
68	Use post acute care as a test bed for providing quality information to patients/ consumers [Reflection: Post acute care may be the best places to get input from patients and families and would allow a view into longitudinal and episodic care.]	4			✓
69	Conduct further research around information that will have the most meaning to patients/consumers in the future; this could be modeled off of the Informed Medical Decisions Foundation, the Robert Wood Johnson Foundation Consumer Purchaser Discloser Project, or the work being done by the Centers for Aging Services Technologies	2, 4			✓

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
Collaboration and Education					
70	Convene ongoing AHRQ, other government, or private third-party organized training/workshops for vendors, measure developers, providers, and other stakeholders to educate one another on a variety of topics (e.g., capabilities, roles, how to build infrastructure in the payer environment, how to understand State-specific processes) as well as to form collaboratives to discuss common challenges and share best practices	2, 5, 8, 11, 12	NT	✓	✓
71	Develop a common vocabulary between measure developers and vendors (e.g., terminology, taxonomy)	3, 5, 8, 12	NT	✓	✓
72	Leverage technical assistance and Regional Extension Centers (RECs) to assist frontline providers with electronic quality measure (eMeasure) implementation, data capture, and report generation [Note: RECs are entities funded by the Office of the National Coordinator for Health IT to help providers adopt and use EHRs.]	7, 11	NT/ MT		✓
73	Create a learning and resource portal for measure developers, vendors, providers, and other stakeholders that will enable access to educational material, vendor capabilities for measure development, and best practices across the eMeasure development and implementation lifecycles	2, 5, 8, 11, 12	NT/ MT	✓	✓
74	Develop curricula for consumers and purchasers on what is available pertaining to quality information and how to interpret it; create a lexicon for consumers and purchasers	2, 4			✓
75	Engage consumers and purchasers as early as possible around activities that include them or are directed toward them	2, 4			✓
76	Acknowledge constraints in participation based on bandwidth (e.g., consumer advocates, purchasers, vendors) and assess value in participation; if value is assessed as high, strategize how to get critical stakeholders more involved	2, 4, 11, 12			✓
77	Continue to foster collaborative relationships (e.g., informaticists and measure developers) and/or leverage professional associations as a means by which to reach providers	11, 12		✓	✓
78	Better engage providers—particularly frontline providers, pharmacists, and post acute care providers—in eMeasure development and implementation; use medical societies as possible intermediaries if directly engaging providers is too difficult (i.e., it may be hard to engage providers already feeling burdened by measurement activities)	2, 11		✓	
79	Use real life examples, case studies, success stories, etc. to engage providers	11		✓	
80	Create financial incentives or incentive models to encourage engagement and collaboration of providers, measure developers, and vendors	5, 11, 12		✓	
81	Provide opportunities for multistakeholder engagement, such as collaboratives and forums, to allow for greater understanding of different stakeholder perspectives (e.g., need for vendors to better understand measure development and measure developers need to better understand particular aspects of technology), to create a better understanding of the opportunities available (e.g., data that can be leveraged) to improve health IT-enabled quality measurement, and to discuss key topics, such as cross-setting measurement	2, 5, 11, 12		✓	

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
82	Offer conferences, continuing medical education, and Webinars to educate providers on quality measurement, including topics such as how health IT-enabled quality measurement leads to improved care for patients and economic practice enhancement, risk adjustment, informatics competencies, and terms and technologies	11		✓	
83	Engage medical specialty societies and professional organizations as a means by which to reach providers, as well as to assist in communication and collaboration among providers, measure developers, and vendors	11		✓	
84	Build provider confidence and demonstrate that the technology does not hinder care or impact the provider adversely [Reflection: Providers will be more engaged when they believe that health IT-enabled quality measurement improves patient care and practice.]	11		✓	
85	Offer a variety of technologies, tools, and communication channels (e.g., collaborative pilot studies, focus groups) to facilitate bidirectional communication and collaboration between measure developers and vendors.	12		✓	
86	Engage frontline clinicians and representatives from professional societies on advisory panels for measure development	3, 5, 11, 13	NT	✓	✓
87	Convene proactive panels or interactions among vendors, measure developers, and providers as part of a transparent measure development and implementation process	5, 7, 8, 11, 12	NT	✓	✓
88	Conduct research and publish case studies in high-impact journals to illustrate value of quality measurement	11		✓	
Other Topics and Recommendations					
89	Harmonize similar measures and value sets used in measures [Reflection: Too often measures are similar but cannot be compared because of differences in denominators, exclusion criteria, or ways in which data is collected.]	7, 11	NT	✓	✓
90	Align measures and incentives across public (e.g., Meaningful Use, EHR Certification, Physician Quality Reporting System (PQRS) and private programs to reduce burden in quality measure data collection and reporting)	7, 11	NT	✓	✓
91	Align new measures to a standard framework, such as the National Quality Strategy or the "Triple Aim"	3		✓	✓
92	Develop an integrated systems approach to the eMeasurement lifecycle (e.g., development, testing, endorsement, implementation), which incorporates provider workflow (e.g., CDS tools), EHR certification, and Federal reporting requirements	3, 6, 7, 8, 11, 12	NT/ MT	✓	✓
93	Use real-time quality measurement to identify a gap in care, prompt a provider to take a specific action to improve the outcome for a patient, change a course of treatment, or refine a care plan.	6		✓	
94	Use real-time reporting to assist with overall improvement of care quality	6		✓	
95	Research consumer trust of health IT (as opposed to IT in other industries, such as banking)	2, 4	NT		✓
96	Research the cause of eMeasure implementation variation	8, 12	NT		✓
97	Identify the correct financial incentives to improve performance	11, 13	NT		✓
98	Research the most effective ways to merge clinical data and claims data	14	NT		✓

	Recommendations/Reflection	Associated RFI Question	Timing	Mentioned In...	
			Near Term (NT)/ Mid-Term (MT)	RFI Responses	Focus Groups
99	Research the best methodologies for case mix and risk adjustment	11, 13	NT		✓
100	Research the best way to include patient-reported outcomes	2, 4	NT		✓
101	Research the transition from paper-based measures to eMeasures to share lessons learned	7, 11	NT		✓
102	Create aspirational measures to drive future technological development	5	NT		✓
103	Research to determine the measures of greatest impact to patient outcomes	2, 4	NT		✓
104	Research the elements that impact consumer choice in other industries for adoption in health care	2, 4	NT		✓
105	Research the future alignment of clinical decision support and quality measurement	6, 11	NT		✓
106	Research the impact of quality metrics on consumer choice in health insurance exchanges	2, 4	MT		✓
107	Research topics in Comparative Effectiveness	NA	MT		✓
108	Research the impact of small variations in measure attributes (i.e., elements of a measure), data collection, and measurement outputs on health care outcomes	3, 9			✓
109	Research and understand a path forward in incorporating NLP [Reflection: Need a longer term vision for NLP.]	9			✓
110	Research options for effective HIE self-sustainability; could look at heavily architected HIEs and the impact of local reimbursement rates, especially around those with PCMHs and Accountable Care Organizations (ACOs) where HIE is more important	10, 14			✓
111	Research additional methods for effective data sharing [Reflection: The Prescription Drug Monitoring Program may be a valuable use case on how to share information.] [Reflection: States have come together to share information through this program but there are still challenges around how to import and print results.]	14			✓

4. Pursing Pathways to Achieve eImprovements

Quality measurement enabled by health IT is important to delivering high-quality, safe, and affordable patient-centered health care in the United States. Quality measurement information can be used to maximize quality improvement efforts, inform consumers, and reward high-quality performers. Advancing health IT-enabled quality measurement is a dynamic enterprise with many advancements occurring through the efforts of a diverse set of stakeholders throughout the health care system. Stakeholders are actively engaged and moving toward eImprovement—measurement which has evolved beyond "checking the box." This means that health IT would need to facilitate measurement so that it can be shared back with end users (e.g., clinicians, care givers, patients) in a timely manner to improve health care outcomes. eImprovement is reliant upon rapid feedback loops that would be supported by meaningful, actionable information at the patient level, provider or health care practitioner level, hospital and health system level, and at the population level.

The importance of informed collaboration was a major theme throughout the development of this report. Incremental advancements such as those identified in the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement require informed and candid collaboration, although preferred collaboration approaches varied widely. Careful thought needs to go into the design of collaboratives to ensure engagement of the breadth and depth of stakeholder groups that is required for success. The ONC/CMS Kaizen event held in January 2013 is an example of the type of cross-contractor, cross-agency, and cross-stakeholder collaboration that is needed to sustain continued advancement of health IT-enabled quality measurement. Such specific, well-managed collaboration could be replicated across a number of other key topic areas and could be initiated by any number of entities. Appendix E contains a list of resources, which includes links to collaboration and ongoing dissemination activities (e.g., National Quality Strategy, AHRQ, ONC, CMS).

The various issues presented in this report—measure development, implementation, and testing; data elements, data capture, and tools to process unstructured data; data access, sharing, aggregation, and integration; patient engagement; and collaboration and education—need to be reconsidered periodically to facilitate the prioritization of activities needed to continue the advancement of health IT-enabled quality measurement. Stakeholders engaged in the ongoing dialog will need to reflect on the various perspectives on quality measurement identified in this report to continue the path forward. Individuals and institutions may see their objectives, priorities, and paths forward differently. Patient perspectives will particularly need to be considered. Additionally, new perspectives may emerge with advancing technological capabilities and changing environmental factors (e.g., evolving medical curriculum, certification requirements in the use of EHRs, quality measurement, quality improvement; reimbursement; delivery system). "Furthermore, measure concepts must be prioritized based on the potential population-wide effect of achieving improvements in that measure."[1]

With continued collaboration, the paths forward may be different but the destination will be the same—the successful next generation of quality measurement. Evolving quality measurement enabled by health IT can facilitate eImprovement and provide a foundation for advancing the "Triple Aim" of better health and better care at a lower cost.

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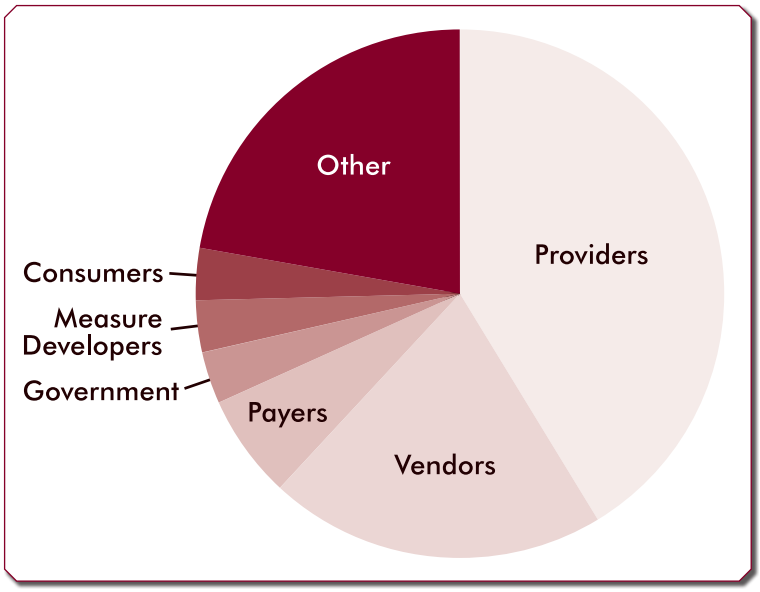
Appendix A. Public and Stakeholder Insights

A.1. Overview

A 15 question Request for Information (RFI) was posted in the *Federal Register* in July 2012 following the publication of an *Environmental Snapshot*—*Quality Measurement Enabled by Health IT: Overview, Challenges, and Possibilities*. The *Environmental Snapshot* identified seven key stakeholder groups—consumers, providers, payers, health IT vendors, government, measure developers and endorsers, and researchers. Questions for the RFI were developed with these stakeholder groups in consideration. Over the course of December 2012 and January 2013, stakeholder-specific (government and nongovernment) focus groups (e.g., government, consumers, providers, payers, health IT vendors, and measure developers and endorsers) were held that further explored topics that were raised in the RFI; members of the research community were included in each of the focus groups. In April 2013, a multistakeholder focus group was held that built on the RFI and previous focus group findings.

Exhibit A-1. Distribution of RFI Respondents by Stakeholder Group



A.2. Public Response to the Request for Information

An RFI was published in the *Federal Register* on July 20, 2012 with an original comment period of 30 days. The comment period was extended for an additional 30-day period due to the number of requests for extension. There were a total of 64 responses. Sixty-three of the respondents were unique; one of the respondents submitted a response to a single question during the first 30 days and then submitted a more complete response during the second 30 days that included the response from the original submission. The respondents were first categorized by the pre-determined list of stakeholder groups (described in the *Environmental Snapshot* and later used as the basis for the focus groups). Exhibit A-1 illustrates the distribution of respondents by stakeholder group.

A.2.1. Question-by-Question Analysis

The RFI included 15 separate questions. Analysis was conducted on a question-by-question basis, as well as across all questions. Fourteen respondents answered all of the questions, 39 answered some of the questions,

and 10 provided general comments on the topic of quality measurement enabled by health IT without alignment to any particular question. Additionally, responses with general comments that did not relate to a specific question (e.g., questions within response labeled, but additional substantive material provided outside of those labeled responses) were labeled "other." Exhibit A-2 provides a count of RFI responses to specific questions by stakeholder group.

Exhibit A-2. Count of Responses to RFI Questions by Stakeholder Group

Question #	All Respondents (n=63)	Providers (n=26)	Vendors (n=13)	Payers (n=4)	Government (n=2)	Measure Developers (n=2)	Consumers (n=2)	Others (n=14)
Question 1 (Roles and Interest)	48	19	11	2	2	2	2	10
Question 2 (Unheard Voices)	44	18	9	2	2	2	2	9
Question 3 (Infrastructure to Support Difficult to Generate Measures)	41	17	8	3	1	2	2	8
Question 4 (Engaging Consumers)	37	14	10	3	-	2	2	6
Question 5 (Leveraging EHR Data for New Measures)	40	18	9	2	1	2	2	6
Question 6 (Real Time Reporting and CDS)	46	19	11	4	1	1	2	8
Question 7 (Strategies in eMeasure Generation)	35	15	9	1	-	2	1	7
Question 8 (MAT and Other Approaches to Effective eMeasure Development)	38	18	8	2	2	2	1	5
Question 9 (Data Standards and NLP)	42	17	10	3	2	2	-	8
Question 10 (Longitudinal Measures and Data Reuse)	34	16	7	2	1	2	-	6
Question 11 (Educating and Engaging Providers)	44	19	10	3	1	2	1	8
Question 12 (Bidirectional Communication between Measure Developers and Vendors)	35	16	9	2	-	2	1	5
Question 13 (Payment Models)	25	13	7	3	-	1	-	1
Question 14 (Aggregation and Automation)	22	9	7	1	-	1	1	3
Question 15 (Examples)	23	8	9	2	-	1	1	3
Other Comments	48	19	11	2	2	2	2	10

Question 1: Briefly describe what motivates your interest in clinically-informed quality measures through health information technology. To what extent is your interest informed by a particular role (e.g., provider, payer, government, vendor, quality measure developer, quality improvement organization, standards organization, consumer advocate) in this area?

In an effort to correctly categorize respondents into a particular stakeholder group, respondents were asked to what extent their interest was informed by a particular role. This information, in addition to reviewing the respondents' Web sites and any self-identified information within the RFI responses, provided the basis for the categorization of respondents into stakeholder groups. Exhibit 2 illustrates the breakdown of the 63 respondents by stakeholder group. Forty-one percent of the respondents were providers or organizations representing providers. Twenty-one percent of the respondents were vendors or organizations representing vendors. Six percent were payers or organizations representing payers. Three percent of the respondents came from departments within two different government agencies. Another 3 percent of respondents were primarily classified as measure developers. Three percent of the respondents were from organizations that represent consumers. Twenty-two percent of the respondents were categorized as "other." This included IT and informatics-related professional associations, consultants, miscellaneous nonprofit organizations, a standards organization, an academic institution, and a researcher (nonphysician).

Question 2: Whose voices are not being heard or effectively engaged at the crucial intersection of health IT and quality measurement? What non-regulatory approaches could facilitate enhanced engagement of these parties?

There were 44 responses to Question 2. Sixty-eight percent of the respondents to this question responded that providers were an unheard voice; particularly, frontline providers and post acute care providers. Most of the respondents who indicated that providers were unheard were providers or organizations representing providers. Using real-life examples (e.g., other providers sharing their personal experiences, case studies), funding, and collaboratives were recommended as approaches to facilitate engagement with providers. Forty-five percent of the respondents to this question indicated that patients, families, and their caregivers are not effectively engaged at the intersection of health IT and quality measurement. Respondents recommended town hall meetings, online forums, and the use of personal health records (PHRs) or portals as ways of facilitating consumer engagement. Twenty-three percent of the respondents to this question suggested that EHR vendors are unheard. The respondents to this question recommended forums and collaboratives would be a useful mechanism for EHR vendors to be able to discuss implementation issues. Exhibit A-3 illustrates how different stakeholder groups responded to this question.

Exhibit A-3. Unheard Voices by Responding Stakeholder Group

Who is an Unheard Voice?	Total Responses	Respondent Classification						
		Providers	Vendors	Government	Measure Developers	Consumers	Payers	Other
Providers (esp. frontline providers and post acute care)	30	17	5	1	1			6
Patients, their families, and caregivers	20	4	6		1	2	2	5
EHR vendors	10	4	2		1			3
Payers and/or Purchasers	4	3				1		
Health informaticists	4	3						1
Measure and guideline developers	3		2					1
Standards developers	3		2					1
Quality organizations	3		2					1
EHR and measure implementers	3		2					1
Consumers of quality information and quality reports	3	1	2					
Other groups of unheard voices	9	4	2	1	1			1

Regardless of the unheard voice, respondents to this question across all stakeholder groups indicated that multistakeholder collaboratives and forums are particularly important. One respondent went so far as to state, "it is not so much that all voices are not heard, but they are not heard in the same place." Additional recommendations included the publication of further research studies (e.g., feasibility, population, measure testing) in the area of quality measurement enabled by health IT.

Question 3: Some quality measures of interest have been more difficult to generate such as measures of greater interest to consumers, measures to assess value, specialty-specific measures, measures across care settings (i.e., measures enabled by health information exchange), and measures that take into account variations in risk. Describe the infrastructure that would be needed to ensure development of such measures.

There were 41 responses to Question 3. The question asked generally about infrastructure and the majority of responses to this question could be classified into one of four categories (see Exhibit A-4): 1) technologic elements of the potential infrastructure (e.g., standard definitions of data elements, tools for aggregation, the need for greater interoperability), 2) policies needed for the infrastructure (e.g., incentives, new payment models to emphasize shared accountability), 3) elements for governance required (e.g., organizational infrastructure to support interdisciplinary collaboration and communication, the need for medical specialty societies and professional organizations to be more engaged in measure development and governance), and 4) processes needed for the infrastructure (e.g., severity and risk adjustment, test cases, field testing).

Exhibit A-4. Categories of Required Infrastructure

Response Categorization	Counts	% of Total (41)
Technology	29	71%
Policy	16	39%
Governance	14	34%
Process	13	32%

Vendors were most likely to discuss technology; however, they also frequently brought up the importance of governance. Two organizations (one a large provider organization and the second a health IT professional association) specifically mentioned the National Quality Strategy and that measures and priorities from Federal programs should be aligned with the National Quality Strategy. Additionally, two respondents to this question explicitly discouraged focusing on a specific technological infrastructure with a caution that it could stifle innovation.

Question 4: What health IT-enabled quality measures, communication channels, and/or technologies are needed to better engage consumers either as contributors of quality information or as users of quality information?

There were 37 responses to question 4. Forty-three percent of Question 4 respondents recommended personal health records and patient portals to facilitate consumer engagement and communication with physicians. Thirty-eight percent recommended the use of innovative technologies (e.g., mobile, telehealth, tablets). Twenty-four percent indicated that patient-reported data needs to be better integrated with other clinical data and better incorporated throughout the standard physician workflow. Respondents across all stakeholder groups agreed on the importance of effectively educating consumers, particularly regarding why measurement is important and how the information can benefit them. Two respondents commented that more information is needed from trusted third-parties that translate health care quality data into information that consumers can use. Respondents also generally agreed on the importance of consumers as contributors of quality information; a common theme was the use of various technologies (e.g., patient portals, personal health records, interactive mobile devices) to support consumer contributions.

Question 5: How do we motivate measure developers to create new health IT-enabled quality measures (which are distinct from existing measures which were retooled into electronically-produced quality measures) that leverage the unique data available through health IT? Please provide examples of where this has been successful. What new measures are in the pipeline to leverage data available through health IT?

There were 40 responses to Question 5. Forty-three percent of Question 5 respondents recommended the development of strong, national, large-scale collaboratives that engage all stakeholder parties. Thirty-six percent of the respondents to this question indicated that a revenue stream for measure development or financial incentives/development contracts might motivate measure developers; however, none of the respondents who have developed measures mentioned financial incentives. Additionally, 14 percent of the

respondents to Question 5 indicated that education (e.g., process of measure development, available technologies, stakeholders' roles, implementation best practices) for the stakeholders is critical. One consumer group noted that many organizations (e.g., State-based, mental health, substance abuse, disability) are far behind in the development of such measures due to a lack of technology, which has not been widely adopted, largely because of the lack of financial incentives and lack of access to the same technical assistance commonly received by hospitals and other medical systems. It was also suggested by one respondent to this question that clinical need and evidence, not the availability data, should dictate which measures should be pursued; new measures should be clinically informed, improvement focused, evidence-based, and data derived in spite of whether they can be fully supported by health IT. Exhibit A-5 illustrates how different stakeholder groups responded to this question.

Exhibit A-5. RFI Respondent Recommendations for Motivating Measure Developers

How to Motivate Measure Developers	Total Responses	Respondent Classification					
		Providers	Vendors	Measure Developers	Consumers	Payers	Other
Strong, national, large-scale collaborative are needed to engage all stakeholder parties.	12	4	4	1			3
Revenue streams for measure development, financial incentives, and development contracts would further motivate measure developers.	10	1	3		1	2	3
Education to provider communities, measurement developers, and other stakeholders is needed to increase engagement.	4	2	1				1
Specialists and specialty societies should be engaged and encouraged to participate in the measure development process to ensure more health IT-enabled quality measures for specialists.	3	1		2			
A business case demonstrating the return on investment (patient outcomes or financial) would strengthen the case for measure developers to pursue complex measures.	3		2		1		
The NQF Framework for multiple chronic conditions provides many insights, including the promotion of the critical exchange of key variables to better manage individuals across settings.	2	2					
Further research is needed to encourage measure development, including research to further develop the evidence base.	2	1				1	
A framework or standardized process for the development of quality measures enabled by health IT would be useful to measure developers.	2		2				
Private and public payers should require electronic specification of measures.	2	1					1
Front line physicians should be encouraged to participate in the measure development process.	2		1		1		
Additional tools (e.g., data standards, guidelines for data integration) would be helpful to measure developers.	2	1				1	
The ability to exchange and access broader data sets freely is needed.	2					1	1
Other potential motivators include payers recognizing the value of registries, quality assurance tools, a greater alignment of measures across Federal programs, and considering nonclinical data.	4	4					

A number of the Question 5 respondents offered examples of successful eMeasures. Where further information could be found in publically available resources, these activities were added to the *Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT* (Appendix C).

The third part of the question asked respondents what new measures are in the pipeline to leverage data available through health IT. Five Question 5 respondents mentioned that they are in some stage of planning or developing quality measures enabled by health IT; however, they did not provide specifics about which measures they are developing.

Question 6: Describe how quality measurement and "real-time" reporting could inform clinical activity, and the extent to which it could be considered synonymous with clinical decision support.

There were 46 responses to Question 6. Sixty-one percent of the Question 6 respondents indicated that real-time quality measurement can identify a gap in care or prompt a provider to take a specific action to improve the outcome for a patient. Twenty percent of the respondents to this question indicated that real-time reporting can assist with overall improvement of care quality. Fifteen percent of the respondents to this question suggested that real-time information can prompt a provider to change a course of treatment or refine a care plan. Another 15 percent of respondents suggested that real-time quality measurement provides real-time information to providers and patients to make informed medical decisions. Respondents to this question also described the extent to which real-time quality measurement and clinical decision support are synonymous. Fifty-eight percent of the Question 6 respondents indicated that real-time quality measurement has broader uses than just clinical decision support; 26 percent stated that real-time quality measurement supports clinical decision support; and 16 percent indicated that real-time quality measurement could be considered synonymous to clinical decision support. Moreover, respondents to this question further observed that not all measures may be suited for real-time quality reporting (e.g., structural, outcome, or volume measures have limited value at the point of care), but for those that are well-suited, results must be delivered to clinicians in ways that are automated and actionable. Two vendors offered ideas on how to most effectively present data (e.g., prioritized alerts, dashboards).

Question 7: Among health IT-enabled quality measures you are seeking to generate in a reliable fashion, including the currently proposed Meaningful Use Stage 2 measure set, what types of advances and/or strategies for eMeasure generation, if pursued, would support more efficient generation of quality measures?

There were 35 responses to Question 7. Forty-six percent of the Question 7 respondents suggested that greater standardization of data, data definitions, nomenclature, medical terminology, code sets, data submission and exchange methods, and value sets are needed to support more efficient generation of quality measures. Seventeen percent of the respondents to this question indicated that harmonization of measures, rule sets, frameworks, and standards are needed across all Federal reporting or measurement programs. An additional 17 percent of the respondents suggested a more centralized and uniform distribution of value sets, a singular platform for measurement, and the consistent development of a measure from multiple sources is needed. Seventeen percent of the respondents to this question recommended that data collection and quality measurement should be a byproduct of care and should represent an understanding of operational

and clinical workflows for an efficient generation of quality measures. Question 7 respondents reporting on Meaningful Use experiences described inaccuracies within eMeasure specifications, the inability to access necessary clinical information, and a lack of sufficient field testing. However, creating a framework for measure development that leverages the EHR incentive program may help these issues in future stages.

Question 8: Many EHR, HIE, and other health IT vendors are developing software code to support measures. Tools such as the Measure Authoring Tool (MAT) were created to improve efficiencies in the process of creating and implementing eMeasures. What additional approaches might be used to enable consistent, accurate, and efficient quality measurement when using health IT?

There were 38 responses to Question 8. Thirty-four percent of the Question 8 respondents indicated the need for standardization in specifications, vocabularies, clinical document architectures, data, and data exchange to improve efficiencies in the process of creating and implementing eMeasures. Twenty-four percent of the respondents to this question indicated that communication, coordination, and collaboration are needed among stakeholders. Additionally, 18 percent of respondents indicated that greater field testing is needed to define validity and accuracy of the data, the measure specifications, and the measure itself. Furthermore, responding organizations that have participated in measure development recommended the continued use of the Measure Authoring Tool and the Quality Data Model; however, they suggested further refinement of these tools particularly in the ability to create longitudinal measures. One Question 8 respondent suggested that focusing on ideal specifications might limit and delay the development of meaningful measures, especially those most meaningful to consumers. A number of the respondents to this question expressed the need for greater understanding of different stakeholder points of view (e.g., need for vendors to better understand measure development and measure developers need to better understand particular aspects of technology).

Question 9: How do you see the establishment and adoption of data standards impacting the future of health IT-enabled quality measurement? For what types of quality measures should a combination of natural language processing and structured data be considered?

There were 42 responses to Question 9 (34 responded to the question around data standards; 28 responded to the natural language processing question). Fifty-three percent of the respondents to the standards question confirmed that data standards have a highly positive impact on quality measurement. Five of these respondents further indicated that data standards will ensure quality measures can be compared across settings. Three of these respondents indicated that data standards can improve interfaces between different IT systems within and across health care organizations and contribute to the quality and validity of the data. A number of the respondents also recommended activities to ensure data standards have a positive impact (e.g., standards need to be advanced and applicable to all providers, nonproprietary innovations and standards, outreach to clinicians).

Twenty-eight of the Question 9 respondents discussed the role of natural language processing in quality measurement. Respondents suggested that particular measures may be likely candidates for natural language processing (e.g., psychiatric measures, radiology measures, pathology measures). Moreover, natural language processing may have potential in validating measures, identifying patient inclusions and exclusions, and

identifying required data that is typically in free text. Respondents to this question observed that it can be difficult to discern the right balance between structured and unstructured data in the EHR. It was suggested that natural language processing may not yet be advanced enough to ensure accuracy and usability in commercially available products, particularly in terms of comparing performance across settings. A number of respondents recommended further testing and demonstrations of natural language processing for the use in quality measurement.

Question 10: Much support has been voiced for the need of longitudinal data in quality measurement. What are the strengths and weaknesses of different information architectures and technologies to support health IT-enabled quality measurement across time and care settings? How can data reuse (capture once, use many times) be supported in different models? What examples might you provide of successful longitudinal health IT-enabled quality measurement (across time and/or across multiples care settings)?

There were 34 responses to Question 10. Twenty-three of these respondents replied to the first part of the question regarding the different information architectures and technologies to support health IT-enabled quality measurement across time and care settings. Thirty-nine percent of the Question 10 respondents indicated that data standards need to be improved. Thirty-five percent of the respondents to this question suggested that data warehouses or registries with patient level data and identifiers are needed. Thirty percent stated that broader interoperability is needed. Seventeen percent of respondents to this question also suggested that barriers around data need to be removed (i.e., ownership, privacy, and governance needs to be resolved) and 9 percent of respondents stated that data quality needs to be improved. Moreover, one of these respondents noted that until there is data liquidity, information will be captured in multiple settings and it will be difficult to reconcile this to "one source of truth."

Ten of the Question 10 respondents discussed data reuse in their responses. Respondents generally concurred with the premise of data reuse (that data should be collected once and used as many times as is practical and possible); however, they did not specifically discuss how it might be supported in different models. Thirty percent of these respondents stated that data reuse requires consistency and standard approaches to recording information in health IT. Another 30 percent recommended databases and registries to ensure high-quality data collection, and 20 percent suggested that data collected as a byproduct of care will reduce provider burden and duplicative data entry.

A number of the Question 10 respondents offered examples of successful longitudinal health IT-enabled quality measurement. These examples included a number of registries. Respondents also referred to programs and activities within their own organizations working toward longitudinal measurement enabled by health IT. Where further information could be found in publically available resources, these activities were added to the Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT (Appendix C).

Respondents to this question also made comments specific to longitudinal measures and data reuse. Two respondents cautioned that too much attention on a specific technical infrastructure can inadvertently discourage or inhibit new, innovative methods and that a "one size fits all" approach will not work. Some respondents also cautioned that secondary use of EHR data must take into account potential data quality

issues inherent whenever data collected for one purpose is reused for another. Finally, architecture data models, standards, and technologies must support accurate aggregation of longitudinal data across the continuum. This will require data governance plans to ensure maintenance and integrity of the data.

Question 11: What are the most effective means by which to educate providers on the importance of health IT-enabled quality measurement and how clinical information is used to support health IT-enabled quality measurement and reporting? How can providers be better engaged in the health IT-enabled quality measurement process?

There were 44 responses to Question 11. Of the 44 respondents, 30 discussed the mechanisms or modalities best suited to educating providers (Exhibit A-6). Twenty-three percent of these respondents suggested conferences, continuing medical education, and Webinars. An additional 23 percent of Question 11 respondents recommended research and case studies in high-impact journals and 23 percent suggested using medical specialty societies and professional organizations as intermediaries to educate providers. Several of these respondents recommended the types of information that need to be conveyed to providers. Respondents indicated that it is important to demonstrate to physicians that health IT-enabled quality measurement leads to improved care for patients and economic practice enhancement. Risk adjustment, informatics competencies, and terms and technologies were also suggested topics.

Exhibit A-6. Means by Which to Educate Providers by Respondent Stakeholder Group

Response Categorization	Total	Respondent Classification			
		Providers	Vendors	Government	Other
Conferences, continuing medical education, and Webinars can provide educational opportunities.	7	4	1		2
Research, case studies, and examples of the effectiveness of quality measurement in high-impact publications and journals.	7	4	1		2
Medical specialty societies and professional organizations are well situated to educate providers.	7	4	1		2
Real world success stories, anecdotes, and personal education from fellow clinicians with similar backgrounds.	4	2	1		1
Vendor-offered training can educate and lead to future collaboration.	4		2		2
Medical student and resident training programs should incorporate education about quality measurement enabled by health IT.	4	1			3
Information and education needs to be built into health IT software.	2		1	1	
Other educational modalities	9	3	2		2

Of the 44 Question 11 respondents, 32 discussed the means by which to engage providers in health IT-enabled quality measurement. Forty-seven percent of respondents to this question indicated that quality measurement results need to be useful to providers in terms of improving care. Thirty-four percent of Question 11 respondents suggested that quality measurement needs to be a byproduct of care, actionable, and

intuitive. Moreover, quality measures should be harmonized across programs to reduce burden. Thirty-one percent of the respondents to this question reported that providers will become more engaged if health IT meets provider needs (e.g., improves productivity, syncs with workflow, is more user-friendly). Overall, respondents emphasized the importance of quality measures being evidence-based, valid, and reliable in addition to the measurement process being reliable and fair.

Two respondents to Question 11 commented that education is not the issue; there are other obstacles such as providers that have not yet adopted health IT, measurement burden, and providers bearing most of the risk and administrative cost of quality measurement programs. Some respondents also further suggested that success in the initial set of eMeasures is needed to build provider confidence and demonstrate that the technology does not hinder care or impact the provider adversely.

Some respondents to this question suggested specific roles for AHRQ and others in engaging providers. For example, one respondent suggested that AHRQ should look at how benchmarking tools could be established which may require the aggregation of data across competing EHR vendors. Another respondent suggested AHRQ should share success stories with providers of cases where outcomes were improved because of availability of data (at the individual or population level).

Question 12: What is the best way to facilitate bidirectional communication between vendors and measure developers to facilitate collaboration in health IT-enabled measure development?

There were 35 responses to Question 12. All of the Question 12 respondents agreed that bidirectional communication between measure developers and vendors is critical to facilitating collaboration in developing health IT-enabled quality measures. Thirty-four percent of these respondents recommended a variety of technologies and tools to facilitate bidirectional collaboration. An additional 34 percent of the Question 12 respondents suggested different modes of communication (e.g., collaborative pilot studies, focus groups) to facilitate communication. Twenty-six percent of the respondents to this question suggested that the timing of communication is fundamental to facilitating bidirectional communication. Most of the respondents that commented on the timing of communication agreed that communication should take place early in the process, often, and ongoing throughout the process. Moreover, 17 percent of the respondents to this question suggested that medical specialty societies should be leveraged in these efforts and 14 percent of the respondents discussed the importance of funding for these types of efforts.

Question 13: To what extent do you anticipate adopting payment models that use quality measurement informed by electronic clinical records (as opposed to exclusively using claims data)? What strategies are you pursuing to gain access to clinical data and test the reliability of health IT-enabled clinical outcome measures? How do you anticipate sharing quality measure results with consumers and other stakeholders?

There were 25 responses to Question 13. Four of the Question 13 respondents specifically commented on the extent to which they anticipate adopting payment models using quality measures informed by health IT. These respondents indicated that they are already engaged in reimbursement models based on quality measurement and they anticipate this increasing over the next 3 to 5 years. Activities such as Accountable Care Organizations, Patient-Centered Medical Homes, health risk assessments, use of the SF36v2™ health

survey, and the use of the CAHPS® survey were all mentioned in relation to these payment models. Some respondents expressed concern about the timing of these activities given that vendors are only beginning to develop and test components to support new payment models and many providers have yet to adopt basic health IT.

Six of the Question 13 respondents discussed gaining access to clinical data to test the reliability of health IT-enabled clinical outcomes measures. It was recognized by most of the respondents who use quality measurement data for reimbursement that testing of the reliability of health IT-enabled clinical outcomes measures would be imperative. Although most respondents are not yet heavily engaged in this area, a few were able to offer recommendations. Three organizations cited using registries to access clinical data and one organization indicated that they are engaging in a clinical data repository pilot to aggregate EHR and claims data. Another organization is planning an internal pilot to test the reliability of health IT-enabled outcomes measures using EHRs when compared with measures obtained through chart abstraction.

Many respondents to this question agreed that sharing quality information with consumers is a good idea. It can be a means by which to inform and engage patients in their care and even encourage adherence to prevention advice. While payer respondents indicated that they are already sharing information with consumers, most respondents are still exploring the most appropriate way to share results with consumers and other stakeholders. Keys to doing this include ensuring the accuracy of data and delivering the data in a way that is meaningful and useful to patients.

Question 14: What tools, systems, and/or strategies has your organization been using to aggregate information from various EHRs and other health IT for use in quality measurement? What strategies is your organization pursuing to move toward greater automation in quality measurement?

There were 23 responses to Question 14. Eight respondents to this question described tools or technologies that they are currently using for aggregation or automation. For example, one respondent mentioned the use of proprietary code, which uses a clinical rules engine to recognize quality data from the EMR and uses it to present quality information at the point of care. Seven Question 14 respondents described tools or technologies that they are developing for improved aggregation or automation. Examples include interfaces to extract meaningful clinical data and solutions that aggregate data across a longitudinal record providing a "one patient" view. Three respondents described some of the challenges associated with greater aggregation and automation. For example, one barrier reported is the different languages that health care providers and other organizations speak (e.g., different terms used to describe same condition), which can result in duplication of effort. These variations in terminologies or languages also act as an impediment to advancements in aggregation and automation being replicated across multiple sites. Another barrier described was the lack of a technological infrastructure in some settings like home health care.

Question 15: Please describe scalable programs, demonstrations, or solutions (domestic or internationally) that show material progress toward quality measurement enabled by health IT.

There were 23 responses to Question 15. Respondents to this question shared 10 different programs, demonstrations, or solutions that they believe show material progress toward quality measurement enabled by health IT. An additional 10 of the Question 15 respondents shared programs and projects occurring within

their own organizations. Where further information could be found in publically available resources, these activities were added to the *Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT* (Appendix C).

A.2.2. Key Concepts Across All Questions

In addition to the question-by-question analysis, responses were examined to identify themes across the questions. Exhibit A-7 represents a characterization of the RFI responses by question and provides a count of how many respondents' answers mentioned meaningful use (MU), clinical decision support (CDS), health information exchange (HIE)/interoperability, or data standards.

MU was mentioned at least once in the responses to all of the questions except for Question 6 (Real Time Reporting and CDS) and was most frequently mentioned in Question 7 responses (Strategies in eMeasure Generation). CDS was most frequently mentioned in Question 6, which directly addressed CDS and HIE was mentioned most in response to Question 3 (Infrastructure to Support Difficult to Generate Measures). Data standards were most frequently discussed in Question 9, which directly addressed standards (Data Standards and natural language processing [NLP]).

Exhibit A-7. Total Mentions of MU, CDS, HIE, and Standards by RFI Question

Question #	All Respondents (n=63)	MU	CDS	HIE/ Interoperability	Standards
Question 1 (Roles and Interest)	48	8	4	9	9
Question 2 (Unheard Voices)	44	5	2	5	7
Question 3 (Infrastructure to Support Difficult to Generate Measures)	41	3	5	15	3
Question 4 (Engaging Consumers)	37	2	1	5	5
Question 5 (Leveraging EHR Data for New Measures)	40	7	5	4	6
Question 6 (Real Time Reporting and CDS)	46	-	33	-	1
Question 7 (Strategies in eMeasure Generation)	35	12	3	2	14
Question 8 (MAT and Other Approaches to Effective Measure Development)	38	6	2	4	15
Question 9 (Data Standards and NLP)	42	6	2	4	40
Question 10 (Longitudinal Measures and Data Reuse)	34	1	1	11	4
Question 11 (Educate and Engage Providers)	44	6	2	3	3
Question 12 (Bidirectional Communication between Measure Developers and Vendors)	35	5	-	4	6
Question 13 (Payment Models)	25	2	1	-	-
Question 14 (Aggregation and Automation)	22	2	3	1	3
Question 15 (Examples)	23	2	-	2	3
Other Comments	48	6	3	4	8
Total Mentions	-	73	67	73	127

A.2.2.1. Responses by Stakeholder

Exhibit A-8 provides a breakdown of the MU, CDS, HIE/interoperability, and standards mentions by each stakeholder group that responded to the RFI. Forty-six percent of the organizations representing providers mentioned MU at least once in their RFI response. Additionally, 54 percent of this stakeholder group mentioned CDS, 46 percent mentioned HIE or interoperability, and 73 percent mentioned standards. Fifty-four percent of the vendor respondents mentioned MU in their RFI response, 85 percent mentioned CDS, 46 percent mentioned HIE or interoperability, and 77 percent mentioned standards. Fifty percent of payers mentioned MU at least once in their RFI response, 100 percent mentioned CDS, 74 percent mentioned HIE or interoperability, and 100 percent mentioned standards. Both of the organizations representing consumers mentioned MU at least once in their RFI response, one of the organizations mentioned CDS, one mentioned HIE or interoperability, and one mentioned standards. Both of the measure developers mentioned MU, CDS, HIE/interoperability, and standards. One of the two government respondents mentioned MU; neither mentioned CDS; and both mentioned HIE and standards. Fifty-seven percent of the "other" respondents mentioned MU in their responses; 57 percent mentioned CDS; 86 percent mentioned HIE or interoperability; and 93 percent mentioned standards.

Exhibit A-8. Mentions of MU, CDS, HIE, and Standards in RFI by Stakeholder Group

Provider Response Categorization	Total # Respondents	MU		CDS		HIE/ Interoperability		Standards	
		#	%	#	%	#	%	#	%
Providers	26	12	46%	14	54%	12	46%	19	73%
Vendors	13	7	54%	11	85%	6	46%	10	77%
Payers	4	2	50%	4	100%	3	75%	4	100%
Consumers	2	2	100%	1	50%	1	50%	1	50%
Measure Developers	2	2	100%	2	100%	2	100%	2	100%
Government	2	1	50%	-	-	2	100%	2	100%
Others	14	8	57%	8	57%	12	86%	13	93%

A.2.2.2. Discussion of Identified Themes

Several topics recurred across questions. Prior to beginning the analysis, Meaningful Use, clinical decision support, and health information exchange and interoperability were identified as concepts that should be tracked across questions. Data standards, collaboration, medical specialty societies, lesser heard providers, and measure harmonization were identified as emerging themes while reviewing the responses.

Meaningful use. Meaningful use (MU) was mentioned by 34 of the 63 RFI respondents in their answers to RFI questions. Some of the respondents discussed their experiences with MU implementation and used these experiences to demonstrate some of the challenges with health IT-enabled quality measurement. A hospital network and an organization representing hospitals specifically noted: inaccuracies within eMeasure

specifications, the inability to access necessary clinical information, a lack of measure stewards, and a lack of sufficient testing. Some providers felt left out of the MU program (e.g., nurse practitioners, hospice, home health care). However, some of the respondents were encouraged by MU and are hopeful that the incentive program and EHR certification requirements will expand further (e.g., include more provider types, specialty-specific requirements). Some of the respondents expressed concern about the validity of the EHR data. One respondent indicated that they conducted a study in which they compared automated electronic reporting to manual review of electronic records for 12 quality measures (10 from MU); they found that the accuracy of electronic reporting varied substantially across the MU measures. Additionally, a number of commenters suggested that government programs in general should be harmonized. One example provided by a respondent was their inability to report for the Physician Quality Reporting System (PQRS) via their EHR. The respondent indicated that EHR vendors must be prequalified by Centers for Medicare & Medicaid Services to submit PQRS data. Physicians who are using a system that has not gone through this process do not have the option to electronically report their PQRS measures, even if their system is certified for the MU program, which requires many of the same measures.

Clinical decision support. Clinical decision support (CDS) was frequently mentioned by respondents. Question 6, which asked about real time reporting and clinical decision support, received the most mentions of clinical decision support. Respondents to Question 6 suggested that real-time quality measurement and CDS are on the same continuum; however, most did not believe them to be the same. One respondent stated that quality measurement and CDS serve different roles; the goal of CDS is not to measure, but to guide providers in decisionmaking. Real-time quality measurement can be fed into CDS, which can improve patient care. However, some respondents were concerned about the ramifications of alert fatigue. One vendor suggested that more sophisticated dashboards could be developed that prioritize interventions that will have the greatest impact for the patient, where excess alerts may be otherwise overwhelming.

Health information exchange and interoperability. Health information exchange (HIE) and interoperability was mentioned at least once by each stakeholder group. HIE was most frequently mentioned in relation to Question 3 (architecture needed for measures more difficult to generate) and Question 10 (need for longitudinal data). Measures across settings and over time are particularly reliant on greater HIE. Respondents noted some of the challenges that are associated with greater HIE: some providers have not yet adopted EHRs; more standards are needed for exchange and interoperability protocols; vendors use proprietary code that can be difficult to facilitate exchange; data ownership, privacy, and governance have yet to be resolved; and patient identifiers are lacking.

Data standards. Data standards were mentioned by all stakeholder groups and were mentioned at least once in every question except for one (Question 6). Forty-nine of the 63 RFI respondents mentioned standards in their RFI responses. Data standards were most frequently mentioned in Question 9, which specifically asked about data standards. Respondents generally indicated that standards are needed to facilitate quality measurement enabled by health IT. Standards were often mentioned in the context of measure development (i.e., importance of having structured, standard data for measure specification). Comments on data standards can best be characterized by one respondent's statement that "the balance between structured and unstructured data in an EHR is a difficult one, since it represents a trade-off between flexibility and standardization." In addition to data standards, respondents also commented on the importance of standards needed for interoperability and exchange protocols, value sets, and terminologies.

Collaboration. Increased collaboration between all stakeholders was a recurring theme as a means by which to improve eMeasure development and implementation. A number of respondents suggested that large-scale, national collaboratives are the best mechanism for engaging a variety of stakeholders. Collaboration was particularly discussed in relation to measure developers and vendors. Responses to Question 12, which focused on measure developer and vendor collaboration, indicated that this communication should take place as early and often as possible throughout the measure development and implementation process. Moreover, collaboration was also cited as a means by which to improve education and engagement of both patients and providers, especially those who feel lesser heard.

Medical specialty societies. Medical specialty societies were mentioned as potential partners in the measure development process and to engage frontline providers. A number of the respondents indicated that providers, particularly frontline providers, are unheard voices. Moreover, respondents suggested that frontline providers need to be more actively engaged in measure development. Medical specialty societies were suggested as possible intermediaries to engage these providers who are already burdened by measurement activities. These organizations are already actively educating and engaging providers, disseminate information, develop measures, and contribute to technical expert panels for measure development.

Lesser heard providers. Some of the respondents indicated that nonphysician and nonacute hospital providers are often overlooked in the conversation. For example, one respondent noted that nurse practitioners were not included in the MU program. Additionally, post acute care and long-term care providers (particularly home health and hospice) indicated that they are lagging behind in health IT adoption. One reason cited for lack of adoption is cost and exclusion from the MU incentive program. One respondent observed that failure to include post acute care providers will inhibit the ability for quality measurement across settings to be captured and used in any meaningful way. Moreover, there appears to be a lack of forums for discussion of such cross-care setting measurement. An organization representing pharmacists suggested that pharmacists are also unheard voices.

Harmonization. Harmonization was frequently mentioned by respondents as a way to reduce burden and to prioritize next steps. Respondents suggested that agreed upon frameworks are needed to drive harmonization. Respondents encouraged AHRQ to work with other Federal partners to align and harmonize existing activities and programs, Federal and State rules, regulations, and guidelines in order to reduce barriers to appropriate quality measure data collection and reporting.

A.3. Focus Groups

The initial findings from the RFI and the objectives for the forthcoming focus groups were presented to government stakeholders in December, 2012. Nineteen individuals participated representing eight agencies. Participants were invited to provide feedback on areas needing further information or activities of which they felt warranted for further pursuit with nongovernment stakeholders. Government participants were also invited to recommend individuals for the stakeholder-specific focus groups.

Between January 7 and January 17, 2013, five focus groups were held via WebEx to discuss issues relating to quality measurement enabled by health IT. Participants were sought that represented a variety of organization

types and sizes, geographic regions, and experiences. Additionally, a combination of established voices and lesser known voices were invited to participate in the focus groups. Thirty-seven individuals representing vendors, measure developers, payers, consumers, and providers participated in the focus groups; no focus group included more than nine nongovernmental participants. Researchers were included across each of the focus groups. Focus groups were organized around each of these broad categories of stakeholders. While many similar themes were explored during each focus group, the questions were unique for each group. The questions were developed using the RFI analyses as a guide to identify areas where further information would be beneficial.

Each stakeholder-specific focus group had its own set of objectives and talking points. Broadly, the objectives were as follows:

- Identify actionable, incremental advancements needed to move toward the next generation of health IT-enabled quality measurement.
- Learn the primary challenges participants of each stakeholder group experience today and foresee in the future in accelerating the use of health IT for quality measurement.
- Elaborate on successful strategies for engaging other stakeholders.

In addition to these objectives, participants were asked to prioritize the actionable, incremental advancements in terms of a near-term or a mid-term timeframe.

On April 1, 2013, a sixth nongovernmental focus group was convened that included a diverse set of stakeholders. This eight-person, multistakeholder focus group was held via WebEx to further discuss issues relating to quality measurement enabled by health IT. Eight individuals participated, representing measure developers, health IT vendors, consumers, payers, and providers. Often these senior-level participants represented experience and expertise in two or more stakeholder perspectives. Topics selected for examination were key topics discussed by RFI respondents and stakeholder-specific focus group participants. The questions were developed using the RFI and focus group analyses as a guide to identify areas were further information would be beneficial.

The objectives of the multistakeholder focus group were as follows:

- Elaborate on identified actionable, pro-active, incremental advancements needed to move toward the next generation of health IT-enabled quality measurement.
- Identify the chronological order of those incremental advancements in the near (1–2 years) and mid-term (3–5 years).
- Discuss the requisite stakeholders—their particular challenges, needs, perspectives, and roles.
- Identify risks or challenges toward accomplishing incremental advancements and possible mitigations.

A.3.1. Focus Group Insights

Over the course of the focus groups, participants provided many critical insights related to the objectives described above. The following provides information on some of the key themes identified throughout the focus groups, which relate back to the focus group objectives.

A.3.1.1. Actionable, Incremental Advancements Needed

New measures. Although each focus group was approached differently, the types of new measures needed for the next generation of quality measurement were discussed in all of the focus groups. Care coordination measures and longitudinal measures (i.e., measures across time and settings) were of interest to many participants in both stakeholder-specific and multistakeholder focus groups. However, the lack of information exchange (i.e., the technical ability to transfer data between facilities and settings) and data liquidity (i.e., the ability of patient data to be accessed and moved throughout the health care system securely) makes these measures difficult to develop and implement. It was suggested by multistakeholder participants that it would also be helpful to measure the success of a team in providing care. One participant mentioned that Kaiser is piloting an effort to measure the success of a team in health care; lessons from this pilot may be useful. Payers would like to see new measures of efficiency, variation, and appropriateness of care; measures that provide a combination of clinical outcomes and cost are of particular interest to them. Multistakeholder participants indicated that there is a lack of measures on efficiency and value. It was suggested that better care coordination and cost measures may be developed if payers and purchasers take an active involvement in measure development. Additional measures for specialty providers are also needed.

Participants across all focus groups indicated that clinical outcome, shared decisionmaking, and functional status measures would be useful, and likely of specific interest to consumers. In other words, measures are needed that help support consumers in caring for themselves and making decisions about their care. Ideally, measures would be meaningful to patients and better describe health care from the patient perspective as opposed to just the provider perspective. Moreover, the consumer participants raised the issue of making measures personal to patients. Risk adjustment measures are best understood in terms of the "average" or "typical" patient; however, patients are more interested in how a particular provider or care site would rate in terms of their specific conditions and/or demographic information. There also needs to be information available to help consumers interpret quality measurement results and research is needed to determine which patient-reported outcomes most improve the status of patients. Multistakeholder participants also discussed the concept of measures that matter to patients. They suggested that patients might want to learn about whether they are getting quality care and how they can evaluate whether the doctor is treating them well. For example, a patient with a particular condition might be interested in seeing how they score against a benchmark. Multistakeholder participants also suggested that patients might be interested in measures around whether they are receiving information on all of the treatment options and cost of care, as well as whether their physicians are communicating with each other.

Across stakeholder focus groups, participants recommended that new measures should be actionable; quality measures should be used to generate CDS and create actionable alerts. One participant indicated that not only should the measures be actionable, but that the specific role(s) responsible for action should be indicated

(e.g., patient, physician, medical assistant, social worker). Moreover, multistakeholder focus group participants suggested that before developing and implementing measures, it is critical to determine whether measuring something really changes the outcome and whether small incremental variances in measurement really makes a difference in outcomes. Overall, participants suggested that there needs to be a better understanding of the purpose of new measures. Moreover, it needs to be determined what data are needed and the best way to collect this data. For example, measures used for quality improvement are different than those used for quality reporting and the information needed for those measures may be collected differently. Participants agreed that it is important that the measures used are making a difference. It was suggested by several multistakeholder participants that the "Triple Aim" (i.e., better care, better health, and lower costs) could serve as a good framework to determine new measures needed that would offer the most value.

One participant suggested that aspirational measures developed for use in 5 years and then in 10 years could help create a vision that health IT could drive towards. It was also suggested that feasibility and the impact of deploying new measures should be assessed.

Harmonization. While it was generally agreed that stakeholders should continue to work toward greater harmonization, there was a general sense that true harmonization of measures would be too difficult and too expensive. One participant stated that harmonization was "next to impossible" because measures are developed both locally and nationally for different purposes. One participant indicated that they are working on new models for harmonization (e.g., data and methodology for measures). The lack of resources available for harmonization also was cited as a challenge, as well as measure ownership and stewardship. However, many participants suggested that alignment to and between Federal, public, and private entities is needed and that alignment to national priorities should be of greater focus than attempting to harmonize similar measures across varied uses.

Additionally, many participants raised the issue of a new measurement development lifecycle. Participants recommended that quality measurement should be aligned with provider workflow. Clinically justified measures would be developed in concert with emerging technology functionality and certification criteria and would also be aligned with workflow. This would ensure that all stakeholders and processes work together and that quality measurement information is more meaningful.

Testing. Participants across the stakeholder groups agreed that measurement testing is a critical activity. Vendors and measure developers were particularly concerned that measurement testing is not where it should be. Currently, there is too rapid a need to eSpecify measures, so the ideal steps for testing do not always occur or are rushed. Vendors suggested that it is important to begin testing while the measures are still being developed. Moreover, there needs to be a standard testing methodology and more funding for testing.

Additionally, feasibility, reliability, and validity of each data element need to be tested in addition to the measures. Ultimately, there is a need to incorporate testing throughout the development and implementation process. Lessons learned from reliability and validity testing should be made available to other stakeholders. However, there are a number of barriers that participants discussed. For example, measure developers had experienced a lack of willingness of organizations to incorporate and test; more funding is needed in this area given the cost to the organization testing the measure. Moreover, it was felt that there is a lack of

best practices for testing in both scope and scale of measure testing. There was also concern that variation occurs when vendors implement the same measure in different sites, which is a factor of many variables (e.g., clinical workflow).

One participant suggested that the ideal steps for measure testing are: (1) understand the data elements that currently exist within EHR, (2) ensure that the data elements that make up the measure can be calculated consistently, (3) ensure that data can be retrieved electronically and that it is consistent with what is seen in EHR, and (4) ensure that fields needed make sense in workflow.

A.3.1.2. Primary Challenges

Data access and sharing. Most of the stakeholder groups explicitly articulated that data sharing is critical to allow for certain types of measures desired for the future (e.g., outcomes, longitudinal). Bidirectional data exchange is needed. Payers, in particular, indicated that they would use "any and all" data that they would have the ability to access. The best mechanisms for integrating clinical and administrative data need to be determined. Additionally, this data needs to be merged with other data (e.g., registries, PHRs, birth/death certificates). Multistakeholder participants also suggested that EHRs are not the only source of information and that different sources of data are needed. It was suggested that registries have become popular with many hospitals; perhaps because they get something of value back from registries in terms of caring for their population. The Prescription Drug Monitoring Program was one example mentioned where States have come together to share information. One stakeholder-specific focus group participant suggested that a national strategy around data sharing is needed to ensure that outputs are valuable to consumers. A multistakeholder participant recommended using MU as a lever. For example, since MU is not yet performance-based, a third track within MU could be offered to encourage development and testing of new innovations in data sharing, such as model policies or new constructs for data sharing. Results could be reported to the Centers for Medicare & Medicaid Services as part of meeting MU requirements and results shared with other stakeholders.

Most of the focus groups indicated that issues around data ownership, proprietary data, governance, privacy, and cost, in addition to technical constraints, remain barriers to data sharing and aggregation. Participants in the multistakeholder focus group suggested that issues around policy (i.e., privacy, governance, data ownership) are more challenging than technology issues. For example, the medical community is still in need of a strategy to address receipt of sensitive information. Participants suggested that there is a reluctance to share data with competitors. Moreover, some participants suggested that not all stakeholders understand the value of sharing data. One participant suggested that there needs to be some neutral third-party to assist with aggregation to ensure that multiple payers are more likely to participate. However, some groups who have tried to do this, such as the work done to set up one all-payer database, found that they cannot be leveraged for another, because each payer database is proprietary. Thus, all-payer databases are not using the same protocols.

Multistakeholder focus group participants also discussed the issue of a common patient identifier. It was agreed that a national patient index is unlikely to occur due to political challenges; however, a means by which to identify a patient across systems and care settings is needed before data can be accurately integrated.

It is also important to be able to identify a patient for safety reasons. Data sharing and patient identification is essential, particularly in local geographic areas. HIEs that have succeeded have a master patient index to cross organizational boundaries. Some entities have created private databases of patient identifiers that can be used to look at patient data across payer lines. Some organizations are using mobile telephone numbers as a patient identifier. Payers are also starting to create private databases to help with private networks and sharing.

Standardization. Standardization was frequently mentioned as another barrier to data sharing as well as health IT-enabled quality measurement in general. For example, hospital labs do not always use standardized coding formats. New standards are also needed for patient reported data. Stakeholders need to be consistently measuring things the same way (e.g., tobacco use or cigarette use) so that outputs are comparable. This may also require data to be codified in a standard way so that it may be measured. One participant recommended using HL7 (Health Level Seven) as a means by which to standardize. Another suggested that professional associations may help drive measurement development and consistency.

Standardization was discussed as both a data entry issue and a workflow issue; there need to be tools to ease data entry. Measure standardization and data element standardization are both needed. It was suggested that vendors do not have a real incentive to build standards into their products. Moreover, multistakeholder focus group participants suggested that more consistency is required within vendors' own platforms. However, participants recognized that a standardized interface may be difficult to achieve when vendors are developing a competitive advantage for their products.

Focus group participants suggested that retooling paper measures into eMeasures requires the use of the Quality Data Model (QDM); however, EHRs do not align with how the QDM recommends collecting data. One participant recommended standardizing eSpecifications and code sets as well as promoting mapping software for commercial, proprietary codes sets to eSpecification code sets. Multistakeholder focus group participants suggested that the value sets need to be harmonized. From a measure development perspective, gaps in the value set still need to be identified. What are the most commonly used codes for ordered tests? One participant used the example of the standardized vocabulary around allergies; there are a host of allergies that cannot be reliable captured in exchanges that are described in MU. There is still much work that is needed in the data dictionary that is aligned to MU standards and categories of information.

Additionally, one multistakeholder focus group participant noted that payer requirements and regulation often drive data usage and how data is collected. Some of the participants suggested that the focus should be on the critical data elements; however, there does not seem to be agreement on what the critical elements are for measurement. Some participants suggested that critical data elements should be those that impact care and should be captured through the provision of care. Others believe that measures should be developed based on what data is available within the EHR. Still others feel that measures should be based on a framework such as the "Triple Aim" and then determination made as to from where data will come. Moreover, if measures are not hard coded into EHRs there would be more flexibility to change what is measured.

Participants discussed the value of using both structured and unstructured data and weighing the balance between more nuanced personalized data and standardization. It was generally agreed that unstructured data offered much promise to illuminate the complexity and multidimensional health and treatment factors, given

the rich, clinical data that it contains. However, in order to be useful, this data would need to be standardized in some way. One participant recommended that speech recognition software might be used to ease data entry by filling in structured data fields. Alternatively, natural language processing (NLP) was suggested as a way to structure the unstructured data and use it for quality measurement. However, there were concerns that there is a lack of standards for NLP, which makes it difficult to translate into various systems. Moreover, multistakeholder focus group participants suggested that there needs to be a longer term vision for NLP and other such products for use in quality measurement. It was suggested that AHRQ might look into evidence around use of NLP and suggest a path forward via an Evidence-Based Practice Center report. Multistakeholder participants also indicated that usability can be a larger issue than whether data is structured or unstructured. For example, some structured data is not useable. In order to move forward, it needs to be determined which data is feasible and usable so that the useable and feasible data can be enhanced upon.

A.3.1.3. Stakeholder Engagement

Collaboration. All stakeholder groups agreed that collaboration is a critical component of effective quality measurement and that all stakeholder groups need to be involved throughout the measure development and implementation lifecycle. Vendors and measure developers agreed that collaboration between the two groups is particularly important; vendors and measure developers should work together throughout the process. However, this level of involvement can be costly as incentives are not currently aligned between the groups. Moreover, it was suggested that a common language between measure developers and vendors will improve collaboration. A resource that summarizes vendor capabilities for measure development would be very useful to developers. Transparency was frequently mentioned as a means for fostering greater understanding and acceptance, although it was noted that competition can inhibit transparency within a particular stakeholder group. Partnership agreements may also be needed between these two parties.

Practitioners at the point of care, from all care settings, were mentioned as a group important to engage throughout the measurement lifecycle. Given the lack of availability of providers for nonclinical activities, it was suggested that medical specialty societies may be a way to gain provider insight. However, some participants emphasized that direct communication with frontline providers would be best. One participant suggested that providers could be engaged in activities that they believe will reduce overall burden (i.e., collaboratives that work to align measures across programs). Such collaboratives would have a direct impact on future burden. Additionally, clinical setting personnel should be incentivized to use newly developed and validated data elements to facilitate quality measurement.

Focus group participants suggested that consumers and employers could be an important addition to the conversation of quality measurement enabled by health IT. Multistakeholder group participants agreed on the importance of including such groups, but cautioned that getting participation could be difficult given availability and other responsibilities. Moreover, the two groups may have differing priorities and should not be substitutes for each other. For example, consumers may be most concerned with access and coverage, while employers may be primarily focused on managing benefits, leaving little additional time to engage here.

It was suggested that AHRQ, or other party, could host a workshop to bring these stakeholders together. The agenda for this workshop could potentially build a foundation for collaboration between vendors and

measure developers and would include discussion of definition of roles, common vocabulary, issues with data elements, measure testing, and challenges in development and implementation. Multistakeholder participants suggested that collaboration is important, but to be sensitive to participants' limited bandwidth for workshops or conferences. They suggested that having a Federal-level host would be preferable and that engaging consumers as soon as possible is important. Participants suggested that these types of activities need to be the right size and valuable to the invitees. It would help if the activities were linked to a national level program or initiative instead of focused solely on measures.

The participants suggested that a curriculum for consumers and purchasers would be useful to creating a lexicon for future engagement of these stakeholders. One of the participants mentioned the Robert Wood Johnson Foundation Consumer Purchaser Disclosure Project as one of the few organizations that were focused on this issue and could provide some insights in how to proceed to engage consumers in these types of collaborations. The NQF's e-Measure Learning Collaborative was also recommended as a potential model for collaboration. Moreover, a collaboration would be beneficial to participants if suggestions on how to build infrastructure in the payer environment were included. Stakeholders often struggle with State-specific processes; collaboratives could provide an opportunity to engage in this area.

Consumer engagement. Participants across all stakeholder focus groups discussed the importance of engaging consumers and their families. It was suggested that patient engagement can lead to shared decisionmaking and can enhance successful provider and patient relationships. Additionally, collecting information prior to an appointment can facilitate the appointment and should also be linked to the EHR. Multistakeholder participants suggested that patients' personal goals should be integrated with clinical goals in the care record. Moreover, shared decisionmaking needs to be incorporated into workflow. Some participants also recommended that the government could provide support to ensure that the Consumer Assessment of Healthcare Providers and Systems (CAHPS®) surveys are implemented more widely.

It was suggested that there are two types of consumers: (1) those currently seeking care and (2) those not currently seeking care. Individuals with chronic conditions or who use technology for managing other aspects of their lives are more likely to use personal health records (PHR). However, despite the availability of PHRs, portals, and other technologies for engaging patients, issues remain around motivating patients to use these technologies. Even when incentivized, consumer adoption of such technologies remains low. To improve use of technologies, participants suggested that systems should not be cumbersome and should require minimal manual entry. Some participants indicated that while privacy issues may be a perceived barrier, lessons may be learned from other industries, such as banking, on how to reassure consumers.

Some participants suggested that education and outreach may be limited to making consumers not currently seeking care aware of what tools and services are available should they require care. This could be similar to knowing about available services in other industries, but only accessing them when needed (e.g., TripAdvisor for travel or OpenTable for dining). Overall, a better understanding of consumer behavior is needed. Additionally, consumers should be engaged in ways they already receive information on other topics (e.g. magazines, Web sites) or using familiar tools positioned in places where they naturally frequent (e.g., iPads in the doctor's office, kiosks at grocery stores or pharmacies). Faith-based organizations and employers may also be channels for distributing information and engaging consumers.

Participants in the stakeholder-specific focus group and in the multistakeholder focus group suggested that there are two levels on which consumers seek quality information: 1) choosing a provider and 2) decision-making around options in treatment. Multistakeholder participants stated that it is important to find out from patients and consumers what type of information they would want for choosing a provider or decision-making around treatment options. Information around selecting a provider should be offered using some understandable framework or categories that are meaningful to consumers. Though provider selection occurs predominately by word of mouth (e.g., recommendations of friends, family), consumers will use online rating systems when they are easily understood and believed to be a reliable source. When it comes to decision-making around care options, consumers need to better understand how to use quality measures to facilitate collaboration with their providers on care decisions (see discussion on New Measures for further information on quality measures that matter to consumers). The multistakeholder participants suggested that consumer views on quality are different from those of clinicians. Quality for consumers needs to be defined through the eyes of the patient and presented in a way that is useful to them. Information needs to come from a trusted resource; consumers do not often trust the quality information from payers. Though health plan benefit designs or tiering has been used by payers to encourage use of high-quality providers or treatment options with the best proven outcomes, these have not always been shown to change consumer behavior because of these trust issues. An individual's primary care physician or other familiar clinician tends to be the most relied on source of information.

Multistakeholder participants also suggested that more needs to be done on how to present information to patients. Much of the information available to patients is incomplete. Quality information cannot be designed *for* patients, unless designed *with* patients. Participants suggested that this is an important area of further research. Information is needed from consumers to determine how information is used and what information is important for decisionmaking. This is critical to providing information that is meaningful and useful to patients. Participants mentioned current work in this area being conducted by the Informed Medical Decisions Foundation and the Centers for Aging Services Technologies. Moreover, participants suggested that there is a need to look at post acute and long-term care settings. Multistakeholder participants suggested that there would be great value in looking specifically at consumer engagement in nursing homes and other post acute care settings (e.g., home health care, skilled nursing) and hospice. These settings would be valuable places to obtain input from patients and families and it would enable testing of new episodic measures.

Appendix B. Methods and Approaches

The Pathways to Quality project began with the development of an *Environmental Snapshot* released in the summer of 2012, which reviewed current literature to provide a brief overview of the historical and current state of quality measurement, described possibilities for the next generation of quality measurement enabled by health information technology (IT), and illustrated some of the challenges facing the advancement of quality measurement enabled by health IT. Simultaneously, research was conducted to identify projects and programs to be included in the *Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT*. This catalog was featured in the 2012 *Environmental Snapshot* and was subsequently updated for this report.

The final report—Health IT-Enabled Quality Measurement: Perspectives, Pathways, and Practical Guidance—represents a consolidation of the findings from stakeholder engagement activities as well as supporting research. Challenges identified in the *Environmental Snapshot* were used as the foundation for developing questions for a Request for Information and Public Comment (RFI). Using the information gathered from the RFI, a set of "deeper-dive" questions emerged for six stakeholder-specific focus groups. The RFI, with additional feedback from the stakeholder focus groups, also informed the questions for a final focus group—a heterogeneous (cross-stakeholder) group. Analyses from each of the stakeholder activities were used in the development of the final report. The *Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT* was continually updated throughout the project. Exhibit B-1 illustrates activities toward completion of this final report.

Exhibit B-1. Approach to Final Report Development

B.1. Environmental Snapshot

In preparation for stakeholder activities, an *Environmental Snapshot* was developed to identify what is known about the relationship between health IT and quality measurement. This snapshot was developed by reviewing published literature and publically available information related to this topic, including existing articles, published reports, work group testimony, and other publically available documents and Web sites released in the previous 4 years to identify current or recently completed initiatives. Literature from the previous 5 years was considered for more general background information on the current state of performance measurement. A four-step approach was used to conduct the research for the *Environmental Snapshot*: establish research criteria, identify key research questions, perform literature review, and synthesize key findings. A more detailed explanation of methodology is available within the *Environmental Snapshot*.

B.2. Stakeholder Engagement

Stakeholder engagement activities were used to build on the findings from the *Environmental Snapshot* to capture a vision for the ideal future state and recommendations for how to achieve that vision. A broad group of 127 stakeholders were engaged through a variety of mechanisms (e.g., RFI, focus groups). The RFI was available to the general public for response. Stakeholders for the focus groups were selected based on varied backgrounds and perspectives; different organizational sizes, structures, and representing different care settings; and based on having either historically represented quality measurement or health IT in the field or whose emerging methodologies or perspectives were brought to the attention of the project team. As resources precluded use of even a larger number of stakeholders, stakeholders were classified based on the primary stakeholder group that they represented, including payers, providers, consumers, measure developers and endorsers, and health IT vendors and technology specialists.

B.2.1. Request for Information and Public Comment

Following the *Environmental Snapshot*, areas where additional input was needed were identified. Based on these areas, an RFI was developed that summarized the Pathways to Quality through Health IT project and key aspects of the *Environmental Snapshot* and invited the public to provide input to 15 questions on electronic quality measurement and its associated challenges.

Questions in the RFI were structured to be broad in nature and open ended. There were no requirements for respondents to answer all of the questions. Additionally, no specific individual or organization was required to respond to the RFI. The RFI instructions included a disclaimer indicating that the RFI was issued solely for information and planning purposes. There were no questions asking for input on potential areas of legislative or regulatory requirements.

The RFI was submitted for publication in the *Federal Register* on June 20, 2012, with an initial 30-day response period. Following requests from the public, an additional 30-day comment period was added. Respondents were instructed to submit to an AHRQ email account, which was set up for the purposes of capturing RFI responses.

All RFI responses were logged upon receipt. Initial analyses were conducted for each question (i.e., examined all responses to a given question). Each question was examined to determine the distribution of stakeholders that responded to that particular question (i.e., which stakeholder groups responded to each question). In addition to the by-question analyses, each RFI response was also examined in its entirety to identify broader themes which allowed for analysis across questions and respondents. Responses that could not be associated with a particular question were categorized as "other." All of these responses were reviewed and key concepts and themes were identified from these responses and included in the across question analysis. A summary of these insights can be found in Appendix A.

B.2.2. Stakeholder-Specific Focus Groups

Based on the RFI responses, key themes were identified to be further explored through a series of focus groups. Five nongovernment, stakeholder-specific, 2.5 hour focus groups were held in January 2013 via Webinar. Each focus group consisted of five to nine nongovernment participants. The focus groups were organized by stakeholder group (e.g., vendors, providers, payers, measure developers, and consumers). Potential participants were identified as a result of their RFI response or through various channels, including recommendations from Booz Allen Hamilton subject matter experts, recommendations from AHRQ staff, and recommendations of other industry experts with whom Booz Allen Hamilton or AHRQ has relationships. Participants were sought that represented a variety of organization types and sizes, geographic regions, and experiences. Additionally, a combination of established voices and lesser known voices were invited to participate in the focus groups. All participants signed confidentiality and nondisclosure agreements to ensure that participants were able to freely contribute.

Prior to holding the nongovernment, stakeholder-specific focus groups, the initial findings from the RFI and the objectives for the forthcoming focus groups were presented to government stakeholders. Participants were invited to provide feedback on areas needing further information or activities of which they wanted the team to be aware. Government participants were also invited to recommend individuals for the stakeholder-specific focus groups. Two separate government meetings were held due to scheduling constraints.

In preparation for each focus group, the RFI responses were examined on a question-by-question basis. The content to be discussed in each stakeholder-specific focus group was informed in part by RFI responses from similar stakeholders or responses from other stakeholders who mentioned an issue particularly relevant to stakeholders in another planned focus group. Review of the RFI responses documented key observations and areas where additional knowledge was needed. These areas for additional knowledge were then used as the basis for the questions asked in the focus groups. Questions were stakeholder-specific to ensure that the unique perspective of a particular stakeholder group could be pursued in its associated focus group. The same questions were not asked across different stakeholder groups; however, common themes overlapped the different focus groups. A focus group guide with a script was developed for each focus group along with a PowerPoint presentation that contained the planned questions. Questions were shared with participants prior to their focus group. Participants were also invited to optional 1 hour, pre-focus group information sessions in which findings from the RFI were presented via Webinar. Each stakeholder-specific focus group had its own set of objectives and talking points. Broadly, the objectives were as follows:

- Identify actionable, incremental advancements needed to move toward the next generation of health IT-enabled quality measurement.
- Learn the primary challenges participants of each stakeholder group experience today and foresee in the future in accelerating the use of health IT for quality measurement.
- Elaborate on successful strategies for engaging other stakeholders.

While the focus groups were not recorded, notetakers captured the key themes and responses to each of the focus group questions. Each set of themes captured in the focus group notes were organized by topic. This facilitated analysis of the key themes from the focus groups across all stakeholder groups. A summary of these insights can be found in Appendix A.

B.2.3. Multistakeholder Focus Group

Potential participants for a final focus group—which included voices from multiple stakeholder groups (e.g., payers, providers, vendors, measure developers/endorsers, consumer advocates)—were identified through various channels, including RFI respondents (e.g., recommendations of specific individuals to include or types of individuals to include), recommendations of stakeholder-specific focus group participants, recommendations from Booz Allen Hamilton subject matter experts, recommendations from AHRQ staff, and recommendations from other industry experts with whom Booz Allen Hamilton or AHRQ has relationships. Participants were sought that represented a variety of organization types and sizes, geographic regions, and experiences. All participants signed confidentiality and nondisclosure agreements to ensure that participants were able to freely contribute.

In preparation for the multistakeholder focus group, actions and activities recommended by stakeholder-specific focus group participants to address some of the key challenges identified by RFI respondents were re-examined. Recommendations where further information or discussion was needed were selected as topics for the multistakeholder focus group. Due to time constraints (session was 3.5 hours), topics were prioritized (e.g., topics most discussed by RFI respondents and stakeholder-specific focus group participants, topics where further conversation could most benefit all stakeholders in making recommendations actionable). Areas chosen for discussion included:

- Data Elements and Data Capture
- Data Access, Sharing, Aggregation, and Integration
- Patient/Consumer Engagement
- New Measures
- Tools to Process Unstructured Data
- Third Party-Facilitated Collaboration Sessions

A focus group guide with a script was developed along with a PowerPoint® presentation that contained the planned questions. Questions were shared with participants prior to the focus group. The objectives of the multistakeholder focus group were as follows:

- Elaborate on identified actionable, pro-active, incremental advancements needed to move toward the next generation of health IT-enabled quality measurement

- Identify the chronological order of those incremental advancements in the near (1–2 years) and mid-term (3–5 years)
- Discuss the requisite stakeholders—their particular challenges, needs, perspectives, and roles
- Identify risks or challenges toward accomplishing incremental advancements and possible mitigations.

While the focus groups were not recorded, notetakers captured the key themes and responses to each of the focus group questions. Each set of themes captured in the focus group notes were organized by topic. This facilitated analysis of the key themes from this final focus group. A summary of these insights can be found in Appendix A.

B.3. Additional Research, Synthesis, and Writing of the Final Report

Key themes were identified during the RFI and stakeholder-specific focus groups. A review of the literature was then conducted to provide additional material and context for these findings from the stakeholder engagement activities (Exhibit B-2). The multistakeholder focus group was held last and focused on a set of six key themes. In addition to these themes (measure development, implementation, and testing; data elements and data capture; data access, sharing, aggregation, and integration; patient engagement; and collaboration) four perspectives emerged from the stakeholder engagement activities. These perspectives were described in relation to the theme topic areas. Recommended activities across all stakeholder engagement activities were organized into the Practical Guidance: Table of Suggested Steps Toward Enhanced Health IT-Enabled Quality Measurement to illustrate the full breadth and depth of recommendations offered by RFI respondents and focus group participants.

Exhibit B-2. Table of Representative Literature Review Search Terms

Representative Literature Review Search Terms		
Health IT, EHR	Using electronic health records to collect performance measures/quality measures	Data capture, health IT/EHRw
Performance measure/quality measure using EHR	EHR, quality measure(s)/performance measure(s)	Patient engagement, health IT/EHR
Performance measure/quality measure using Health IT	Health IT, quality measurement/ performance measurement	Data sharing, health IT/EHR
Automation, quality measurement/ performance measurement	Data requirements, EHR	Natural language processing/ unstructured data tools, health IT/EHR
Data aggregation, health IT	Interoperability, health IT	Health information exchange/HIE

B.4. Update of Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT

The Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT, originally presented in the *Environmental Snapshot*, was updated based on information provided through the RFI, during the focus groups, or suggested by other means subsequent to the writing of the *Environmental Snapshot*. Projects and programs where further information could be found in publically available resources were included. The updated Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT is located in Appendix C of this report, Health IT-Enabled Quality Measurement: Perspectives, Pathways, and Practical Guidance. Appendix C includes projects and programs identified during the creation of the *Environmental Snapshot* as well as those identified subsequently. Though great effort was made to include as many projects or programs as possible, the Catalog should not be considered comprehensive or exhaustive. To assist readers in finding programs relevant to their own work, each project or program has been tagged with a few key words that illustrate attributes of the program. This tagging, however, should also not be considered all inclusive; tags are based on general program descriptions and may be limited by the ability to obtain information on the program from public sources.

Appendix C. Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT

The following table (Exhibit C-1) describes a subset of programs and initiatives at the Federal and State levels as well as efforts by private sector stakeholders, which are intended to improve quality measurement through health information technology (IT). This catalog is not exhaustive, but rather illustrates the breadth and depth of the work being conducted in this area by a variety of stakeholders.

The list is sorted into three categories, Federal programs, State/regional, and private, and then sorted alphabetically by name of the organization. Illustrative tags have been added to increase the ease of finding programs or initiatives that may be of most interest. Though many programs and initiatives covered a great breadth of topics, each may not be tagged with all corresponding topics, but the ones that seemed to make the program or initiative most distinct from others. Tags are broken into three categories: Functional (i.e., the primary function[s] of the program or initiative), Topical (i.e., any key topics addressed by the program or initiative), and Special, which denotes uniqueness to care settings, specific diseases, or certain populations. A complete list of tags used can be found at the end of this appendix.

*Exhibit C-1. Partial Catalog of Current Activities To Improve Quality Measurement Enabled by Health IT**

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Federal Programs (alphabetized by agency)					
Ambulatory Safety and Quality Program[19]	HHS/AHRQ	Develops safety and quality measures in ambulatory care settings, automates quality measurement, demonstrates the ability of electronic data systems (such as EHRs or claims data merged with EHR data) to expand potential safety and quality measures, and exhibits improved ability to export data for reporting performance on measures and improvement.	Quality Improvement	Patient Safety; EHR	Ambulatory Care
Atlas of Integrated Behavioral Health Care Quality Measures[20]	HHS/AHRQ	Supports the field of integrated behavioral health care measurement by presenting a framework for understanding measurement of integrated care, providing a list of existing measures relevant to integrated behavioral health care, and organizing the measures by the framework and by user goals to facilitate selection of measures.	Quality Improvement	Care Coordination; Standards	Behavioral Health

* To avoid redundancy, references for this Appendix are included in the References for the main body of this report.

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Consumer Assessment of Healthcare Providers and Systems (CAHPS®)[21]	HHS/AHRQ	Supports and promotes the assessment of consumers' experiences with health care through the development of standardized patient questionnaires that can be used to compare results across sponsors over time and generation of tools and resources that can be used by sponsors to produce understandable and usable comparative information for both consumers and health care providers.	Consumer Engagement	Patients/ Consumer	
Enabling Quality Measurement (EQM) Through Health IT RFA[22]	HHS/AHRQ	Awarded grants to develop safety and quality measures in ambulatory care settings, automate quality measurement, demonstrate the ability of electronic data systems, expand potential safety and quality measures, and demonstrate improved ability to export data for reporting performance on measures and improvement. Of the 17 total grants awarded through this RFA in 2007, two grants ended in 2009 and the remaining 15 projects were awarded no-cost extensions. Of these, 13 ended in 2010 and two are scheduled to close in 2011.	Grant Program; Quality Improvement	EHR; Patient Safety	Ambulatory Care
Learning Networks[23]	HHS/AHRQ	Disseminates and implements products, tools, and research to specific target groups as part of AHRQ's Knowledge Transfer (KT)/Implementation program.	Training & Technical Assistance	Information Exchange	
MONAHRQ[24]	HHS/AHRQ	A desktop software tool that enables organizations—such as state and local data organizations, regional reporting collaboratives, hospitals and hospital systems, and health plans—to quickly and easily generate a health care reporting Website. MONAHRQ® analyzes, summarizes, and presents information in a format ready for use by consumers and other decisionmakers.	Tools/ Products		
National Guideline Clearinghouse (NGC)[25]	HHS/AHRQ	A public resource for evidence-based clinical practice guidelines.	Measures Clearinghouse	Care Coordination	
National Quality Measures Clearinghouse™ (NQMC)[26]	HHS/AHRQ	A database and Web site that holds information on specific evidence-based health care quality measures and measure sets. NQMC is sponsored by AHRQ to promote widespread access to quality measures by the health care community and other interested individuals.	Measures Clearinghouse	Data Repository	
National Quality Strategy[13]	HHS/AHRQ	Promotes quality health care for patients, families, and communities and guides the actions of all those who deliver and pay for care. Incorporates the evidence-based results of research and scientific advances in clinical medicine, public health, and health care delivery.	Advisory Body; Quality Improvement; Public Health		
National Resource Center for Health IT (NRC)[27]	HHS/AHRQ	A public resource for sharing research findings, best practices, lessons learned, and funding opportunities with health IT researchers, implementers, and policymakers. The NRC has more than 10,000 documents, presentations, articles, and tools available.	Training & Technical Assistance	EHR Adoption/ Implementation	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Selecting Quality and Resource Use Measures: A Decision Guide for Community Quality Collaborative[28]	HHS/AHRQ	Informs readers about the most critical issues to consider when selecting and adopting performance measures.	Collaborative; Training & Technical Assistance	Decisionmaking	
Transforming Healthcare Quality Through Health IT (THQIT) Program[29]	HHS/AHRQ	Awarded grants from 2004-2009 to 118 grantees that planned, implemented, and studied health IT implementations across a wide range of care settings, communities, and health IT systems. [Link to the left offers information about many of the 118 programs.]	Grant Program	EHR Adoption/ Implementation; Innovation; Information Exchange	Rural Health; Post Acute Care; Acute Care Hospital; Community Health Centers
Portal Compares APCD, ASC X12, and NCPDP Standards Data[30]	HHS/AHRQ/ CDC	A metadata registry of health care-related data elements and their sources. Includes a core set of data elements from each state's All-Payer Claims Database (APCD) and the corresponding data elements in (1) the Accredited Standards Committee (ASC) X12 5010 standard, (2) the ASC X12 Post-Adjudicated Data Reporting Guides (in development), and (3) the National Council for Prescription Drug Programs (NCPDP) Uniform Healthcare Payer Standard Implementation Guide Version 1.0.	Quality Improvement	Portal; Using Claims Data; Standards	
Health IT Portfolio[27]	HHS/AHRQ/ NRC	Develops and disseminates evidence and evidence based tools about the impact of health IT on health care quality	Quality Improvement;	EHR	
CDC's Information Technology Strategic Plan (CITSP)[31]	HHS/CDC	Guides CDC's public health priorities to maximize the value of health IT to CDC programs. Promotes improved health outcomes through the provision of high-quality, timely, relevant information to CDC, its partners, and its customers.	Advisory Body	EHR Adoption/ Implementation	
National Committee on Vital and Health Statistics[32]	HHS/CDC	Serves as an advisory body to HHS on health data, statistics, and national health information policy. It fulfills important review and advisory functions relative to health data and statistical problems of national and international interest, stimulates or conducts studies of such problems, and proposes improvements of the Nation's health statistics and information systems.	Advisory Body; Quality Improvement	EHR	
National Healthcare Safety Network (NHSN)[33]	HHS/CDC	A public health surveillance system that provides data reported from health care facilities to the CDC to improve patient safety at local and national levels. Health care facilities report infections directly into NHSN either voluntarily or because of their state's requirements. The CDC prepares Hospital Acquired Infection Summary Data Reports that include both national and State-specific data.	Public Health	Hospital Acquired Infections; Patient Safety	Acute Care Hospital; Ambulatory Care; Community Health Centers

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Public Health Information Network (PHIN)[34]	HHS/CDC	A national initiative to increase the capacity of public health agencies to exchange data and information electronically across organizations and jurisdictions (e.g., clinical care to public health, public health to public health and public health to other Federal agencies). To do so, PHIN promotes the use of standards and defines functional and technical requirements for public health information exchange.	Public Health	EHR Adoption/ Implementation; Standards; Innovation; Information Exchange	
Center for Medicare and Medicaid Innovation (CMMI)[35]	HHS/CMS	Fosters health care transformation by finding new ways to pay for and deliver care that improve care and health while lowering costs. The Center identifies, develops, supports, and evaluates innovative models of payment and care service delivery for Medicare, Medicaid, and the Children's Health Insurance Program (CHIP) beneficiaries using an open, transparent, and competitive process.	Research; Payer	Innovation; Care Transformation; Payment/ Reimbursement	Medicare; Medicaid
Comprehensive Primary Care Initiative[36]	HHS/CMS	A multipayer initiative fostering collaboration between public and private health care payers to strengthen primary care. Medicare works with commercial and State health insurance plans and offers bonus payments and other resources to primary care doctors who better coordinate care for their Medicare patients.	Collaborative	Care Coordination; Information Exchange	Primary Care, Medicare
Electronic Health Record (EHR) Incentive 2013 Reporting Pilot Program[37]	HHS/CMS	A voluntary electronic reporting option to satisfy the Clinical Quality Measures (CQM) objective for the EHR Incentive Program. Participation in the EHR 2012 Reporting Pilot is highly encouraged and allows hospitals an opportunity to pioneer efforts for submitting CQMs electronically. Eligible Hospitals and critical access hospitals (CAHs) attest, using the attestation tool provided by CMS to report CQMs, submit Quality Reporting Document Architecture (QRDA) Category I data during the submission period for episodes of care occurring in Federal Fiscal Year 2012, or both attest and submit CQMs electronically through the pilot.	Incentive Program; Quality Improvement; Public Reporting	Meaningful Use; EHR	Acute Care Hospital; Medicare
The Hospital Engagement Networks[38]	HHS/CMS	Through CMS' Partnership for Patients, 26 State, regional, national and hospital system organizations serve as Hospital Engagement Networks to help identify successful solutions to reduce hospital-acquired conditions and disseminate these best practices to other hospitals and health care providers.	Quality Improvement; Collaborative; Training & Technical Assistance	Hospital Acquired Infections	Acute Care Hospital; Medicare
Hospital Inpatient Quality Reporting Program[39]	HHS/CMS	Provides hospitals a financial incentive to report the quality of their services and provides CMS with data to help consumers make more informed decisions about their health care.	Public Reporting; Quality Improvement	Decisionmaking; Patients/ Consumers	Acute Care Hospital; Medicare; Medicare

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Integration of the Physician Quality Reporting System (PQRS) and Medicare and Medicaid EHR Incentive Program[40]	HHS/CMS	Introduces a common set of clinical quality measures and a reporting method through which eligible professionals can report to one program and qualify for both incentive programs. Under this pilot, individual eligible professionals who meet PQRS reporting requirements and use certified EHR technology, also meet the requirements for the meaningful use objective to report clinical quality measures.	Public Reporting; Incentive Program	EHR; Meaningful Use	Medicare; Medicaid
Measures Management System (MMS)[41]	HHS/CMS	Composed of a set of business processes and decision criteria that CMS funded measure developers (or contractors) follow when developing, implementing and maintaining quality measures. The major goal of the MMS is to provide sufficient information to help measure developers produce high caliber quality measures that are appropriate for accountability purposes.	Tools/ Products; Quality Improvement	EHR; Innovation	
Medicare/Medicaid EHR Incentive Program[40]	HHS/CMS	Provides a financial incentive for the "meaningful use" of certified EHR technology to achieve health and efficiency goals. By putting into action and meaningfully using an EHR system, providers will gain benefits beyond financial incentives—such as reduction in errors, availability of records and data, reminders and alerts, clinical decision support, and e-prescribing/ refill automation.	Incentive program	Meaningful Use; EHR; Payment/ Reimbursement; Decisionmaking	Medicare; Medicaid
Nursing Home Quality Initiative[42]	HHS/CMS	Provides consumers a resource for the level of care nursing homes are providing for their residents' physical and clinical needs by collecting assessment data that has been converted into quality measures.	Public Reporting	Patient/ Consumers; Patient Safety	Aging Services; Post Acute Care
Physician Quality Reporting System (PQRS)[43]	HHS/CMS	A reporting program that uses a combination of incentive payments and payment adjustments to promote reporting of quality information by eligible professionals (EPs). The program provides an incentive payment to practices with EPs (identified on claims by their individual National Provider Identifier [NPI] and Tax Identification Number [TIN]). EPs satisfactorily report data on quality measures for covered Physician Fee Schedule (PFS) services furnished to Medicare Part B Fee-for-Service (FFS) beneficiaries (including Railroad Retirement Board and Medicare Secondary Payer).	Public Reporting; Incentive Program	Patient Safety; Payment/ Reimbursement	Medicare
Quality Improvement Organizations (QIOs)[44]	HHS/CMS	Monitors the effectiveness and quality of care provided to Medicare beneficiaries by improving the effectiveness, efficiency, economy, and quality of services.	Quality Improvement	Care Coordination	Medicare
Bureau of Primary Health Care (BPHC)[45]	HHS/HRSA	Supports Health Center Controlled Networks with grants that will improve the quality of care at community health centers through implementation and adoption of health IT. The grants, totaling more than $18 million in Affordable Care Act funds, support 37 health center networks across the country.	Grant Program; Quality Improvement	EHR Adoption/ Implementation	Primary Care; Community Health Centers

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
CAREWare[46]	HHS/HRSA	Free, scalable software that manages and monitors HIV clinical and supportive care and quickly produces a completed Ryan White HIV/AIDS Services Report (RSR). A number of States and cities run CAREWare with multiple providers connecting into one central database. These network setups allow the ability to track service usage and monitor the quality of care across multiple agencies.	Tools/ Products	EHR	HIV
IT Toolboxes[47]	HHS/HRSA	Provides electronic/online resources and technical assistance to health centers, other safety net providers, and ambulatory care providers to improve patient care.	Training & Technical Assistance; Quality Improvement	Patient Safety; Meaningful Use	Ambulatory Care; Community Health Centers
Office of Health Information Technology and Quality (OHITQ)[48]	HHS/HRSA	Through June of 2013, provided trans-HRSA expertise and leadership on health IT and quality issues. Representing all of HRSA and its diverse grantees, OHITQ sought to improve the quality of health care for safety net populations and strengthen the health workforce that serves these populations. OHITQ worked in collaboration with other HHS agencies (e.g., ONC, AHRQ) and external stakeholders (e.g., NQF) on important health IT and quality initiatives.	Training & Technical Assistance	EHR Adoption/ Implementation	Disadvantaged Populations; Community Health Centers
Rural Health Information Technology Network Development Program (RHITND)[49]	HHS/HRSA	Enhances health care delivery in rural America by supporting rural health networks in the adoption and meaningful use of electronic health records/ electronic medical records (EHRs/EMRs) as a -time funding opportunity to assist networks in achieving EHR/EMR meaningful use requirements by 2014. Activities supported by RHITND grant funds include: workflow analysis, EHR/EMR strategic plan development, EHR/EMR training, purchase of health IT equipment, identification of certified health IT equipment vendors, and installation of broadband.	Training & Technical Assistance; Grant Program	Meaningful Use; EHR Adoption/ Implementation	Rural Health
Indian Health Services (IHS) Health Information Exchange (HIE)[50]	HHS/ IHS	Improves coordinated health care of the Native American population by enabling connectivity to internal facilities and external agencies in the Nationwide Health Information Network (NwHIN) for the secure exchange of relevant patient data. Allows facilities to maintain ownership and control over their patient data. Assists in meeting meaningful use criteria to exchange health information among providers and patients to improve quality, safety, and efficiency of care, patient engagement, and population health.	Health Information Exchange	Meaningful Use; Care Coordination; Information Exchange; Patient Safety	Native Americans

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
National Data Warehouse (NDW)[51]	HHS/ IHS	A state-of-the-art, enterprise-wide data warehouse environment that was instituted by the National Patient Information Reporting System (NPIRS) in 2006 for IHS' national data repository dating back to October 2000. It gathers, stores, reports, and allows easy access to accurate historical data in an effort to meet the administrative and clinical needs of Indian Health end users nationwide.	Public Reporting; Data Repository; Training & Technical Assistance	Information Exchange	Native Americans
Resource and Patient Management System (RPMS)[52]	HHS/ IHS	A decentralized, integrated solution that combines flexible hardware configurations, over 50 software applications, and network communication components to manage clinical, financial and administrative information in health care facilities. Used daily by American Indian/native Alaskan health professionals and private sector health facilities to efficiently manage programs, maximize revenue generation, and provide high-quality care for patients.	Tools/ Products	EHR; Data Aggregation/ Integration; Information Exchange	Native Americans
Standard Code Book (SCB)[53]	HHS/ IHS	Contains a listing of codes and terms intended to ensure standardized documentation of medical information.	Tools/ Products	Standards	Native Americans
Patient Reported Outcomes Measurement Information System (PROMIS)[54]	HHS/NIH	A system of highly reliable, precise measures of patient-reported health status for physical, mental, and social well-being. It measures what patients are able to do and how they feel by asking questions. PROMIS' measures can be used as primary or secondary endpoints in clinical studies of the effectiveness of treatment.	Tools/ Products	Care Transformation; Patients/ Consumers	
Value Set Authority Center (VSAC)[55]	HHS/NIH	Provides downloadable access to all official versions of vocabulary value sets contained in the 2014 Clinical Quality Measures (CQMs). The value sets describe the specific included and excluded populations in order to properly calculate each 2014 CQM. Each value set consists of the numerical values and human-readable names drawn from standard vocabularies (e.g., SNOMED CT® and ICD-10-CM) which are used to define clinical concepts used in clinical quality measures. VSAC is provided by the National Library of Medicine (NLM), in collaboration with ONC and CMS.	Data Repository	Standards	
AHIC Quality Workgroup[9]	HHS/ONC	A Federal advisory body chartered in 2005 to make recommendations to the HHS Secretary on how to accelerate the development and adoption of health IT.	Advisory Body	EHR; Innovation	
Beacon Community Cooperative Agreement Program[56]	HHS/ONC	Provides funding to communities that have begun development of secure, private, and accurate systems of EHR adoption and health information exchange. These communities have specific and measurable goals for health systems improvement: quality, cost-efficiency, and population health.	Training & Technical Assistance; Beacon Communities	EHR Adoption/ Implementation	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Beacon Evidence and Innovation Network (BEIN)[56]	HHS/ONC	Provides the Beacon Communities with guidance in documenting and disseminating lessons learned and results of their individual efforts in a systematic way in order to generate actionable, rigorous evidence, and top identify strategies for leveraging health IT to improve patient care and reduce costs.	Training & Technical Assistance; Beacon Communities	EHR; Information Exchange	
Cypress[57]	HHS/ONC	A rigorous and repeatable testing tool of EHRs and EHR modules for calculating Meaningful Use (MU) Stage 2 Clinical Quality Measures (CQMs), as part of the 2014 EHR Certification program supported by the Office of the National Coordinator for Health IT (ONC). The tool is open source and freely available for use or adoption by the health IT community, including EHR vendors and Authorized Testing Labs and includes a standard test data of synthetic patient records that exercises all of the MU Stage 2 CQMs for Eligible Professionals and Eligible Hospitals.	Tools/ Products; Testing	Meaningful Use; EHR; Innovation; Standards	
Health eDecisions Initiative (HeD)[58]	HHS/ONC	An initiative using the Standards and Interoperability (S&I) Framework to develop a new harmonized standard for use in knowledge artifacts in a clinical decision support (CDS) environment.	Collaborative	Decisionmaking; Standards	
HIT Policy Committee[59]	HHS/ONC	A Federal advisory committee that provides recommendations on policy framework for the development and adoption of health information infrastructure for health information exchange to the National Coordinator for consideration.	Advisory Body	EHR Adoption/ Implementation	
HIT Standards Committee[60]	HHS/ONC	Makes recommendations to the National Coordinator on standards, implementation specifications, and certification criteria for the electronic exchange and use of health information.	Advisory Body	EHR Adoption/ Implementation; Standards; Information Exchange	
Meaningful Use (MU)[61]	HHS/ONC/ CMS	Defines the use of EHRs and related technology within a health care organization. To achieve meaningful use and collect eligible incentives, eligible providers and hospitals must adopt certified EHR technology and use it to achieve specific objectives, broken down into a series of stages.	Incentive Program; Quality Improvement	Meaningful Use; Standards	
National Center for Cognitive Informatics and Decision Making in Healthcare (NCCD)[62]	HHS/ONC	A nationwide collaborative established in response to the urgent and long-term cognitive challenges in health IT adoption and meaningful use. NCCD's vision is to become a national resource that provides strategic leadership in patient-centered cognitive support research and applications in health care.	Collaborative Research	Meaningful Use; Patients/ Consumers	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
National Survey on HIE in Clinical Laboratories[63]	HHS/ONC	A National Survey on health information exchange in clinical laboratories to provide new data on a state and national level to provide policymakers with a comprehensive understanding of electronic laboratory information exchange capacity and activity among clinical laboratories across the nation.	Research	Information Exchange	Laboratory
ONC S&I Framework Query Health Project[64]	HHS/ONC	A public-private collaborative to develop standards and services for population level queries and to understand population level trends. The ONC S&I Framework Query Health Project is use the Health Quality Measure Framework (HQMF) and Quality Reporting Document Architecture (QRDA) in their development.	Collaborative Public Health	Standards	
Regional Extension Centers[65]	HHS/ONC	Offers technical assistance, guidance, and information on best practices to support health care providers' efforts to become meaningful users of EHRs. Provides training and support to assist doctors and other providers in EHR adoption and guidance and technical assistance for EHR implementation.	Training & Technical Assistance	EHR Adoption/ Implementation; Meaningful Use	
Strategic Healthcare IT Advanced Research Projects (SHARP) Program[61]	HHS/ONC	A collaborative research program that addresses problems that impede the adoption of health IT. Translates research into patient-centered health IT products and services to create improvements in critical areas resulting in high-performing, learning health care system. SHARP is led by major collaborative efforts at the University of Illinois at Urbana-Champaign, the University of Texas at Houston, Harvard University, the Mayo Clinic of Medicine, and Massachusetts General Hospital.	Research; Tools/ Products; Quality Improvement	EHR Adoption/ Implementation; Innovation	
State Health Information Exchange (State HIE) Cooperative Agreement Program[66]	HHS/ONC	Supports States in establishing health information exchange capability among health care providers and hospitals both within and across States. Builds on existing efforts while moving toward nationwide interoperability. Awardees are responsible for increasing connectivity and enabling patient-centric information flow to improve the quality and efficiency of care.	Training & Technical Assistance; Care Provider	Information Exchange	Acute Care Hospitals
Test Method Approved by the National Coordinator 2014 Edition[67]	HHS/ONC	Provides test procedures, test data, and test tools for use in testing and certifying EHR technology under the ONC HIT Certification Program (formerly referred to as the Permanent Certification Program). Certification of health IT provides assurance to purchasers and other users that an EHR system offers the necessary technological capability, functionality, and security to help them meet MU objectives and measures.	Testing; Tools/ Products	EHR Adoption/ Implementation; Meaningful Use	
Behavioral Health Clinical Quality eMeasures Project[68]	HHS/SAMHSA/ ONC	Develops a portfolio of behavioral health clinical quality measures suitable for inclusion in the EHR incentive program for Meaningful Use of Health Information Technology.	Quality Improvement	Meaningful Use; EHR Adoption/ Implementation	Behavioral Health

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Blue Button Initiative[69]	VA	Allows Veterans to download their personal health information from their My HealtheVet account. VA developed the Blue Button in collaboration with CMS and the Department of Defense, along with the Markle Foundation's Consumer Engagement Workgroup. VA's Blue Button was made nationally available in October 2010.	Consumer Engagement	Care Coordination; Patients/ Consumers	Veterans
National Center for Patient Safety (NCPS)[70]	VA	Leads the VA's patient safety efforts and to develops and nurtures a culture of safety throughout the Veterans Health Administration (VHA).	Quality Improvement	Patient Safety	Veterans
Quality Enhancement Research Initiative (QUERI)[71]	VA	Enhances the quality and outcomes of VA health care by systematically implementing clinical research findings and evidence-based recommendations into routine clinical practice. In evaluating quality of care, the QUERI process focuses on three elements: structure, process, and outcomes.	Research	Innovation; Patient Safety	Veterans
VA Medical Center in Indianapolis to exchange medical information using the Nationwide Health Information Network[72]	VA	A pilot, developed in partnership between the VA Medical Center in Indianapolis and the Indiana Health Information Exchange (IHIE), to securely exchange EHR information using the Nationwide Health Information Network. Allows for safer and more secure access of electronic health information that will enhance quality of care for Veterans.	Health Information Exchange: Collaborative Quality Improvement	EHR; Care Coordination; Information Exchange	Veterans
Veterans Health Information Systems and Technology Architecture (VistA)[73]	VA	Provides an integrated inpatient and outpatient electronic health record for VA patients and offers administrative tools to help VA deliver the best quality medical care to Veterans.	Tools/ Products	EHR	Veterans
State/Regional Programs (alphabetized by state)					
California Pay for Performance (P4P)[74]	Integrated Healthcare Association (IHA)	A US non-governmental physician incentive program, founded in 2001, that is managed by the Integrated Healthcare Association (IHA) on behalf of eight health plans representing 10 million insured persons. This program represents the largest and the longest running U.S. example of data aggregation and standardized results reporting across diverse regions and multiple health plans. California consumers benefit from the availability of standardized performance results from a common measure set, which are available to the public through the Office of the Patient Advocate in the state of California.	Incentive Program; Quality Improvement	Data Aggregation/ Integration; Payment/ Reimbursement; Standards	
Colorado Beacon Consortium (CBC) Health Care Demonstration Program[75]	Colorado Beacon Consortium	A 3-year program, awarded $11,878,279 by HHS, to expand the Quality Health Network (QHN) services and to provide a Practice Transformation Team including Quality Improvement Advisors (QIA) to work with medical practices.	Beacon Communities; Quality Improvement	EHR Adoption/ Implementation; Care Transformation	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Colorado Associated Community Health Information Enterprise (CACHIE) (AHRQ EQM Grant)[76]	Colorado Community Managed Care Network (CCMCN): Non-Profit	An interoperable quality information system for a collaborative network of seven community health centers (CHCs) within the Colorado Community Managed Care Network (CCMN). CCMN is a non-profit network organization that supports Federally Qualified Health Centers in improving quality of care and health outcomes through data driven improvement processes and supports CHCs in achieving meaningful use of EHR technology.	Quality Improvement	Information Exchange; Meaningful Use	Community Health Centers
eHealth Connecticut[77]	eHealth Connecticut	Facilitates the statewide adoption of EHRs, health information exchange, and quality reporting to dramatically improve the quality, safety, and efficiency of health care in Connecticut.	Collaborative; Health Information Exchange; Quality Improvement;	EHR Adoption/ Implementation; Patient Safety; Information Exchange	
Hawai'i Island Beacon Community (HIBC)[78]	College of Pharmacy at the University of Hawaii at Hilo	A $680,000 contract awarded to North Hawai'i Community Hospital (NHCH) to implement an HIE system throughout the North Hawai'i region. This HIE will impact more than 32,000 patients and mark the first step toward an island-wide HIE.	Health Information Exchange; Beacon Communities	EHR Adoption/ Implementation; Information Exchange	
Central Indiana Beacon Community[79]	Indiana Health Information Exchange	Provides information in a secure, standardized, and electronic format, enabling information to follow the patient, rather than being housed in one physician office or a single hospital system. Assembles this health data in a meaningful way to help providers achieve improved health outcomes for their patients, with a specific focus on cancer screenings, diabetes care, heart health, asthma care, well-child visits, and other care interventions.	Health Information Exchange; Beacon Communities	Care Coordination; Patients/ Consumers; Information Exchange; Data Aggregation/ Integration	Asthma; Diabetes; Cardiac Care; Cancer
The Quality Health First Program[79]	Indiana Health Information Exchange	Helps identify, prevent, and manage chronic conditions in patients. Patients needing interventions are flagged for their providers, allowing them to make the best care decisions possible. The program uses information from the Indiana Network for Patient Care to assemble lab results, immunizations, diagnoses, cardiology and radiology reports, procedures, and medication information. This information is then organized in easy-to-read patient summaries that can be used before, during, or after patient visits to make the best use of physicians' time.	Quality Improvement	Information Exchange; Data Aggregation/ Integration; Decisionmaking	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Indiana Heath Information Exchange[79]	Indiana State and local health departments, Regenstrief Institute, private hospitals, BioCrossroads and other health care and community organizations in Indiana	Operates the Nation's largest HIE, partnering with communities throughout Indiana to ensure health information is where it needs to be when it needs to be there to improve care coordination and patient outcomes.	Health Information Exchange	Care coordination; Patient Safety; Information Exchange	
Iowa e-Health[80]	Iowa Department of Health	Collaboration of consumers, health care providers, payers, and others to establish an electronic HIE for Iowa. The Iowa Health Information Network will allow consumers, health care providers, payers and other participants securely access vital real-time patient health information throughout the state of Iowa and beyond.	Health Information Exchange	Patients/ Consumers; Care Coordination; Information Exchange	
Crescent City Beacon Community (CCBC) and the Primary Care Development Corporation (PCDC) Transformation Initiative[81]	CCBC, PCDC (Louisiana)	Seeks to strengthen the New Orleans health care infrastructure and improve care for more than 50,000 underserved patients by introducing innovative health IT systems and tools designed to improve quality, care coordination, and population health.	Public Health; Quality Improvement	Innovation; Information Exchange; Care Coordination	Primary Care; Disadvantaged Populations
Louisiana Health Care Redesign Collaborative and Louisiana Health Information Exchange (LaHIE)[82]	Louisiana National Quality Forum	Supports the exchange of health information among providers and organizations in the State, according to nationally recognized standards. The Forum collects and uses data to guide improvements in health care quality.	Health Information Exchange; Quality Improvement	Patients/ Consumers; Care Coordination; Information Exchange	
All-Payer Claims Database[83]	Massachusetts Government	Streamlines required data submissions for payers and also affords a deep understanding of the Massachusetts health care system by providing access to timely, comprehensive, and detailed data. The APCD is comprised of medical, pharmacy, and dental claims, as well as information about member eligibility, benefit design, and providers for all payers covering Massachusetts residents.	Payer	Using Claims Data; Data Aggregation/ Integration	
Eastern Montana Telemedicine Network (EMTN)[84]	Eastern Montana Telemedicine Network	Promotes telemedicine services at the local, State, regional, national, and international level. Uses telecommunication technologies to transmit real-time video, audio, and medical images. Patients can remain in their communities and see specialists from Montana and across the Nation.	Quality Improvement; Tools/ Products	Telemedicine	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
HealthShare Montana (HSM)—Continuity of Care Record/Document (CCR/CCD)-Based HIE Project[85]	HealthShare Montana	Implements a statewide HIE using aggregated CCR/CCD standard data under a collaborative agreement with ONC. The CCR or CCD contains an extract of a person's medical information and can include the core data required in the CMS Final Rule for EHR programs. It has been standardized in terms of content and technical specifications, can be populated as a stand-alone document or extracted from an EHR, can be exchanged electronically, viewed using any Web browser, copied to electronic media or printed on paper; and can be used in a clinical data repository for information analysis that can provide key performance measure reports to providers and other users.	Health Information Exchange	EHR; Information Exchange; Data Aggregation/ Integration	
Minnesota eHealth Initiative[86]	Minnesota Department of Health	Allows consumers, health care providers, payers and other participants to securely access vital real-time patient health information throughout the state of Iowa and beyond to help make best decisions. Funded through the State Health Information Exchange Cooperative Agreement Program, established under the HITECH Act and administered by ONC.	Health Information Exchange	Patients/ Consumers; Care Coordination; Information Exchange; Decisionmaking	
Aligning Forces for Quality (AF4Q) Initiative in Minnesota[87]	Robert Wood Johnson Foundation (Minnesota)	A state initiative, part of a broader stakeholder group, led by Minnesota Community Measurement (MNCM) to accelerate the improvement of health by publicly reporting health care information. It strives to be a trusted source for performance measurement and public reporting of quality data and to serve as a resource for providers to improve care and for patients to make better health decisions.	Public Reporting; Quality Improvement	Decisionmaking; Patients/ Consumers	
Bringing Measurement to the Point of Care (AHRQ EQM Grant)[22]	New York City Department of Health and Mental Hygiene	Implements meaningful measurements of the quality of care that focus on public health priority issues, disadvantaged populations, and small office practices. The New York City Department of Health and Mental Hygiene (DOHMH) Take Care New York initiative has articulated 10 priority public health issues that require coordinated action between health care providers, patients, community organizations, and government agencies. The DOHMH Primary Care Information Project (PCIP) uses health IT for population-wide measurement and improvement of clinical care in these 10 domains, particularly among disadvantaged populations.	Public Health	Care Coordination	Disadvantaged Populations; Primary Care
NewYork City's Health eHearts Initiative[88]	New York City Department of Health and Mental Hygiene	A one-year pilot to reward and recognize primary care physicians who use electronic health records to help adult patients achieve excellent heart health and improve outcomes in four specific areas: aspirin, blood pressure control, cholesterol control and smoking cessation (ABC's).	Incentive Program	Patients/ Consumers; EHR; Care Transformation	Primary Care; Cardiac Care
Tri-State Regional Extension Center (REC)[89]	HealthBridge (Ohio, Indiana, Kentucky)	Provides support for medical practices to implement and use EHRs effectively to exchange patient information securely, meet meaningful use requirements, and qualify for incentive payments.	Training & Technical Assistance	EHR Adoption/ Implementation; Meaningful Use	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Medical Assistance Provider Incentive Repository (MAPIR)[90]	Pennsylvania Department of Public Welfare	A State-level information system for the EHR incentive program that tracks and acts as a repository for information related to payment, applications, attestations, oversight functions, and interface with CMS' National Level Repository.	Data Repository; Incentive Program	EHR; Meaningful Use	
The Vermont Blueprint for Health[91]	Vermont	A state-led health care reform program dedicated to achieve well-coordinated and seamless health services to the residents of Vermont by implementing a novel model designed to improve the health of the population, to enhance the patient experience of care, and to reduce the per capita cost of care.	Quality Improvement	Care Transformation	
Private Programs (alphabetized by organization)					
AltaMed Provider Portal[92]	AltaMed	A bidirectional provider portal offering connectivity across AltaMed providers. Focuses on three integrated IT platforms to engage with community physicians to implement constant process improvements to improve quality, enhance patient experience, and provide value. Currently supports AltaMed's PCMH and has plans to expand beyond AltaMed providers.	Care Provider; Tools/ Products; Data Repository	Patients/ Consumers; EHR; Data Aggregation/ Integration	Patient Centered Medical Home
American Medical Association (AMA) Physician Consortium for Performance Improvement (PCPI)[93]	AMA	A physician-led program dedicated to enhancing quality and patient safety with the ongoing mission to align patient-centered care, performance measurement, and quality improvement. As one of the leading measure developers in the United States, PCPI identifies, develops, tests, and implements measures with the goal of improving care and accountability. PCPI is also a leading force in enabling the use of measures in EHRs, which often need to be re-specified from the paper measure definition.	Quality Improvement	EHR; Patient Safety	
Collaborative for Performance Measure Integration with EHR Systems[94]	AMA	A collaborative co-sponsored by the American Medical Association (AMA), the HIMSS Electronic Health Record Association (ERHA), and NCQA and comprised of a group of stakeholders—performance measure developers, EHR vendors, expert EHR users, national quality improvement organizations and technical experts in physician performance measurement and quality improvement—who have a shared goal of facilitating the integration of performance measures with EHR systems.	Collaborative Quality Improvement	EHR	
National Quality Registry Network (NQRN) Coordinating Task Force[95]	AMA	Develops draft recommendations for consideration by interested organizations (e.g., government agencies such as CMS) for ways in which existing registries can be better used and new registries incentivized.	Advisory Body	EHR; Innovation; Patients/ Consumers	
The Testing and Prototyping Quality Electronic Measures (eMeasures) Network (TPQeNet)[96]	AMA/NCQA	A collaborative led by PCPI with NCQA to create and deploy quality measures in EHRs. This initiative tests current and new quality measures to help build confidence in quality reports and demonstrates how to run a testing network.	Testing; Collaborative	Innovation; EHR	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Physician Quality Reporting System (PQRS)Academic Testing Network[96]	AMA/UHC	A collaborative project with the University HealthSystem Consortium (UHC) and the Association of American Medical Colleges (AAMC). PCPI-developed, individual physician measures used in the 2010 PQRS and this collaborative focus on measures that are NQF time-limited endorsed or NQF-endorsed® and due for Maintenance.	Collaborative; Quality Improvement; Testing	Patient Safety; Care Coordination	
Ambulatory Surgery Center Quality Collabo7[6]	ASC Quality Collaboration	A group of leaders and experts from the ambulatory surgery industry and ambulatory surgery organizations who focus on health care quality and safety to develop standardized quality measures, publically report quality data, advance ASC quality, and to advocate for a system that provides meaningful information for stakeholders.	Public Reporting; Collaborative; Quality Improvement	EHR Adoption/ Implementation; Patient Safety	Ambulatory Care
Bipartisan Policy Center[98]	Bipartisan Policy Center (BPC)	A nonprofit organization that drives principled solutions through rigorous analysis, reasoned negotiation, and respectful dialogue. Founded in 2007 by former Senate Majority Leaders Howard Baker, Tom Daschle, Bob Dole, and George Mitchell, BPC combines politically balanced policymaking with strong, proactive advocacy and outreach.	Advisory Body; Quality Improvement	Innovation	
Bipartisan Policy Center: Transforming Health Care: The Role of Health IT[98]	Bipartisan Policy Center	A study of common attributes of the nation's highest performing health care organizations to help shape public policy and investment decisions regarding health IT.	Advisory Body; Quality Improvement	EHR Implementation; Innovation; Patients/ Consumers	
Bipartisan Policy Center, Health Innovation Initiative[99]	Bipartisan Policy Center	Conducts research and collaborates with experts and stakeholders across every sector of health care to develop recommendations that promote innovation and the use of IT to support improvements in the cost, quality, and patient experience of care.	Advisory; Collaborative; Research	Innovation	
Boundary Medical[100]	Boundary Medical	A scalable, cloud-based software system used to support the medical specialty outcomes network model. It can also be used for other outcomes tracking programs as well as for traditional registries or independent clinical studies.	Tools/ Products		
Monitoring Intensification of Treatment for Hyperglycemia and Hyperlipidemia (AHRQ EQM Grant)[22]	Brigham and Women's Hospital	A new, validated method to monitor diabetes quality of care measure utilizing natural language processing (NLP) tools to analyze clinical free-text notes in an EMR. A previous application, which analyzes clinical notes in order to identify treatment intensification of hypertension, will be further developed to identify treatment intensification in the management of hyperglycemia and hyperlipidemia.	Tools/ Products	EHR	Diabetes

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
California Clinical Data Project: CALINX Standards[101]	California Healthcare Foundation	A collaborative effort of industry stakeholders to develop and implement laboratory and pharmacy data standards throughout California to facilitate data integration of clinical information systems. This project improves chronic care by promoting access to, and integration of, clinical data at the point of care.	Collaborative	Standards	Laboratory; Pharmacy
Building Modular Pediatric Chronic Disease Registries for QI and CE Research (AHRQ EDM Grant)[102]	Children's Hospital Medical Center Cincinnati	Supports a learning health care system by building an open-access data sharing network focusing on a pediatric population to improve care and increase patient participation. The modular, versatile, and scalable registry will be populated by EHRs and used to support quality improvement and comparative effectiveness research.	Collaborative; Tools/ Products; Research	Data Repository	
Open Access for Patients to their EMRs through MyChart[18]	Cleveland Clinic	A new transparent MyChart EMR gives Cleveland Clinic patients access to pathology records, X-ray reports, physician notes, and the list of their current health issues, which physicians use to briefly describe a patient's health status, recent concerns, and known diagnoses. Patients will be able to view online nearly everything their doctor sees in their EMR, except for behavioral health information, which is prohibited from release by state law.	Tools/ Products	EHR; Patients/ Consumers	
CommonWell Health Alliance[103]	CommonWell Health Alliance	An independent not-for-profit trade association that is open to all health information technology vendors devoted to better exchange patient data between systems and care settings. It plans to promote and certify a national infrastructure with common standards and policies that will ensure that products that display its seal have been certified to work on the national infrastructure. Initial participation includes Cerner, McKesson, Allscripts, athenahealth, Greenway, and RelayHealth.	Tools/ Products	Standards; EHR; Information Exchange	
Developing and Using Valid Clinical Quality Metrics for Health Information Technology with Health Information Exchange (AHRQ EQM Grant)[22]	Cornell University, Joan and Sanford I. Weill Medical College	Identifies existing, and creates new, clinical quality of care metrics able to be reliably retrieved from electronic systems, such as EHRs and HIEs.	Research	Information Exchange; EHR; Standards; Innovation	
The Personal Outcome Measures[104]	Council on Quality and Leadership	A quality measure system with indicators that provide investigators with the building blocks toward development of quality measures that could ascertain whether services ensure consumer choice, participant-direction, and individual satisfaction.	Quality Improvement; Tools/ Products	Patients/ Consumers	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
The Direct Project[105]	The Direct Project	Develops specifications for a secure, scalable, standards-based way to establish universal health addressing and transport for participants (including providers, laboratories, hospitals, pharmacies and patients) to send encrypted health information directly to known and trusted recipients over the Internet.	Tools/ Products	Information Exchange; Standards	
eHealth Initiative[8]	eHealth Initiative	A multistakeholder organization that seeks to drive improvement in the quality, safety, and efficiency of health care through information and technology. Creates tools and strategies to drive improvement in the quality of health care by promoting the use of technology and information. Also engages in research, education, and advocacy.	Collaborative; Quality Improvement; Tools/ Products; Training & Technical Assistance; Research	EHR; Innovation; Patient Safety	
The CPM Framework ™[106]	Elsevier/Clinical Practice Models (CPM) Resource Center	Consists of six clinical practice models that can be applied across the continuum of care. Offers an updated and unified relational database that stores tagged data elements for comprehensive care planning/coordination and documentation of clinical services by a diverse interdisciplinary team. The result is standardized clinical documentation support that is evidence-based and designed to capture individual details at the patient level.	Tools/ Products	Care Transformation; Care Coordination	
Quality Alliance Steering Committee[107]	Engelberg Center for Health Care Reform at the Brookings Institution	A collaborative effort aimed at implementing measures to improve the quality and efficiency of health care across the United States. It combines the efforts of the Ambulatory Care Quality Alliance (AQA) and the Hospital Quality Alliance (HQA) to better coordinate the promotion of quality measurement, transparency, and improvement in care.	Advisory Body; Collaborative	Decisionmaking; EHR; Patients/ Consumers	Acute Care Hospital; Ambulatory Care
Electronic Support for Public Health–Vaccine Adverse Event Reporting System (ESP: VAERS) (AHRQ EQM Grant)[108]	Harvard Pilgrim Health Care, Inc.	A generalizable system to facilitate detection and clinician reporting of vaccine adverse events to the National Vaccine Adverse Event Reporting System (VAERS) using EMR data available from all ambulatory care encounters in a large multispecialty practice. Served as an extension of the Electronic Support for Public Health project, an automated system using EHR data to detect and securely report cases of statutory notifiable diseases to a local public health authority.	Public Health; Tools/ Products	Patient Safety; Patients/ Consumers	Ambulatory Care
Advanced Hospital Care in Hawaii[109]	Hawaii Medical Services Association (HMSA) and Premier	A national program sponsored by HMSA for eligible Hawaii hospitals that sets the standard for patient-centered, high quality, and efficient health care. The program sets targets and helps hospitals measure and speed performance improvements. The Nation's first statewide partnership between a health plan and hospitals, this project uses Premier QUEST best practices to measure their progress.	Quality Improvement; Collaborative	Information Exchange; Payment/ Reimbursement	Acute-Care Hospital

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
HealthQx Platform[110]	HealthQx	A platform that can analyze large amounts of data to support value-based health care decisions.	Tools/ Products	EHR; Decisionmaking	
Patient-Centered Medical Home (PCMH) Initiative[111]	Highmark, Inc.	An initiative that includes nearly 1,050 primary care doctors in more than 100 physician practices that cover about 171,000 Highmark members in western and central Pennsylvania and West Virginia. The initiative was expanded after a successful one-year pilot and is based on the PCMH premise that physicians take greater accountability in coordinating the care for patients in a PCMH model. This accountability means assisting patients and their families with treatment and treatment options and providing better patient education and use of tools such as EHRs.	Payer	Patients/ Consumers; Payment/ Reimbursement	Patient Centered Medical Home; Primary Care
Electronic Health Record Association (EHRA)[112]	HIMSS	A trade association of EHR companies, addressing national efforts to create interoperable EHRs in hospital and ambulatory care settings. EHRA operates on the premise that the rapid, widespread adoption of EHRs will help improve the quality of patient care as well as the productivity and sustainability of the health care system.	Collaborative; Advisory Body	EHR Adoption/ Implementation; Information Exchange	Acute Care Hospital; Ambulatory Care
Clinical Quality Information (CQI) Workgroup[113]	HL7	Creates and maintains information technology standards in support of improving health care quality, including clinical care and fosters collaboration between quality measurement, outcomes and improvement stakeholders. Coordinates externally with organizations such as: Quality Measure Developing and Endorsement Organizations, Health Care Accrediting Organizations, Health Care Delivery and Management Organizations, Patient Safety Organizations, Quality Improvement Organizations, professional societies and government agencies.	Collaborative; Quality Improvement	Standards	
Informed Medical Decisions Foundation[114]	Informed Medical Decisions Foundation	Advances evidence-based shared decisionmaking through research, policy, clinical models, and patient decision aids. Their mission is to inform and amplify the patient's voice in health care decisions by developing high quality decision aids, funding research and shared decisionmaking demonstration sites, and advancing their mission through outreach and advocacy.	Quality Improvement; Collaborative; Research	Patients/ Consumers; Decisionmaking	
Integrating the Healthcare Enterprise[115]	Integrating the Healthcare Enterprise	An initiative by health care professionals and industry to improve the way computer systems in health care share information. Promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care on the premise that systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers to use information more effectively.	Collaborative	Information Exchange; Standards	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Venous Thromboembolism (VTE) Collaborative[116]	Johns Hopkins Medicine	Implemented a mandatory risk assessment tool and prophylaxis order set into the computerized provider order entry (CPOE) system at Johns Hopkins Hospital. Because of the electronic format of the risk assessment tool and prophylaxis order set, they were able to establish a database that captures patient-specific risk strata and prophylaxis prescribed. This database is used to link process measures, screening, risk stratum and prescription to clinical outcomes in order to evaluate and improve methods for VTE prevention and to better define the concept of VTE associated preventable harm.	Collaborative; Data Repository; Tools/ Products	EHR; Patient Safety; Hospital Acquired Infections	Acute Care Hospital
Medication Monitoring for Vulnerable Populations via Information Technology: Ambulatory and Safety (AHRQ EQM Grant)[117]	Johns Hopkins University	A practice-based, cross-sectional demonstration of the ability of interoperable health information exchange and a Certification Commission for Health Information Technology-certified EHR to provide useful quality and safety measures for the vulnerable populations served by two Baltimore Medical System (BMS) Community Health Center (CHC) clinics. The quality and safety measures evaluated were developed for ambulatory care by NCQA, supported by NQF, and focused on safety monitoring for chronic medications commonly used by patients with heart disease and diabetes mellitus.	Research; Care Provider	EHR; Information Exchange; Medication Management; Patient Safety	Ambulatory Care; Cardiac Care; Diabetes; Community Health Centers; Pharmacy; Disadvantaged Populations
Core eMeasure Pilot Project[118]	The Joint Commission	A pilot project that tested the feasibility, usefulness, and costs associated with the implementation of core measures. Participants were drawn from eleven State hospital associations that expressed an interest in participating in a pilot project. Five were randomly selected to participate (Connecticut, Michigan, Missouri, Georgia and Rhode Island). Each hospital association then identified a single performance measurement system and hospitals to participant, for a total of 83 hospital participants across nine states.	Testing; Research; Collaborative	EHR	Acute Care Hospital
Oryx[119]	The Joint Commission	Integrates outcomes and other performance measure data into the accreditation process. ORYX measurement requirements are intended to support Joint Commission-accredited organizations in their quality improvement efforts. Performance measures are essential to the credibility of any modern evaluation activity for health care organizations.	Tools/ Products; Quality Improvement	Patients/ Consumers; Standards; Data Aggregation/ Integration	
Automating Assessment of Asthma Care Quality (AHRQ EQM Grant)[120]	Kaiser Foundation Research Institute	Used specialized computer programs to analyze the electronic medical records of asthma patients and ultimately to determine (1) whether asthma patients in two different health care systems are receiving recommended care and (2) how to better monitor the delivery of asthma care.	Tools/ Products; Research	EHR	Asthma

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Feedback of Treatment Intensification Data to Reduce Cardiovascular Disease (CVD) Risk (AHRQ EQM Grant)[121]	Kaiser Foundation Research Institute	Leveraged health IT, including Kaiser Permanente's Certification Commission for Health Information Technology-certified Epic-based EMR HealthConnect and the population management software tool used for the Preventing Heart Attacks and Strokes Everyday (PHASE) program, to create and deliver treatment intensification information to providers who have high CVD-risk patients. Worked with eight primary care facilities of Kaiser Permanente Northern California to assess whether the use of systematic feedback on the need for treatment intensification in patients with poor control of CVD risk factors improves risk-factor control.	Collaborative; Tools/ Products; Research	EHR	Primary Care; Ambulatory Care; Cardiac Care
Using Information Technology to Improve the Quality of Cardio¬vascular Disease (CVD) Prevention and Management (AHRQ EQM Grant)[122]	Kaiser Foundation Research Institute	Uses EMR data to determine the relationship between patterns of preventive and disease management care for CVD and the occurrence of disease events that this care is designed to prevent.	Research; Quality Improvement	EHR	Cardiac Care
SUrveillance, PREvention, and ManagEment of Diabetes Mellitus (SUPREME-DM) (AHRQ EDM Grant)[102]	Kaiser Permanente Colorado	A project to develop a comprehensive, longitudinal clinical registry of a population of approximately 1.3 million insured patients with diabetes mellitus and a similar database of all members without diabetes from 11 integrated health care delivery systems. The registry will cover the period from 2005-2013, draw from demographic and clinical data elements in EHRs and other system databases, capture patient-reported data where it is already being routinely collected, and calculate and add data on medication adherence.	Research; Quality Improvement	Data Repository; EHR; Data Aggregation/ Integration; Medication Management	Diabetes
Enhancing Clinical Effectiveness Research with Natural Language Processing of EMR (CER Hub) (AHRQ EDM Grant)[102]	Kaiser Permanente Northwest	A project to create and evaluate an Internet-based "Comparative Effectiveness Research Hub" (CER Hub) where researchers can collaboratively develop standardized problem-specific processors of electronic clinical data (with medical classifier applications, or MediClass) in support of CER studies. The project also aims to make a proven natural language processing (NLP) technology broadly available for enhancing use of EMR data.	Collaborative; Research	Standards	
Center for Aging Services Technologies (CAST)[123]	LeadingAge	An international coalition of more than 400 technology companies, aging services organizations, research universities, and government representatives that lead the charge to expedite the development, evaluation and adoption of emerging technologies that can improve the aging experience. Its mission is to unleash the potential of technology for innovative development across the continuum of health care, housing, and services for the aging in order to improve and maximize the lives of elder Americans.	Research; Quality Improvement	EHR; Innovation; Patients/ Consumers	Aging Services

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Markle Common Framework for Private and Secure Health Information Exchange[124]	Markle Foundation	Provides the initial elements of a comprehensive approach for secure, authorized, and private health information sharing based on Fair Information Practice Principles (FIPPs), so that patients and their authorized providers can have access to vital clinical data when and where needed.	Quality Improvement	Information Exchange	
The Missouri Center for Primary Care Quality and Excellence[125]	Missouri Primary Care Association (MPCA) Center for Quality	Houses MPCA's training and technical assistance programs and quality improvement initiatives. Focuses on strengthening individuals, organizations and communities by facilitating learning, leadership development, quality enhancement and networking in support of efforts to develop, implement and sustain community health improvements. Products and services cover quality improvement, performance improvement and best practices; data collection, research and analysis; technical assistance; and network development.	Training & Technical Assistance; Quality Improvement; Research	EHR; Patients/ Consumers	Primary Care
Minnesota Hospital Association Pilot Project[126]	Minnesota Hospital Association	A pilot project sponsored by AHRQ in 2007 to link hospital clinical information to administrative data. Despite some initial challenges, this project was successful. Results showed that the use of hybrid data allowed for more accurate comparisons of risk-adjusted mortality and risk-adjusted complications across Minnesota hospitals. These increases in accuracy represent an important step toward targeting quality improvement efforts in Minnesota and provide important lessons that are being leveraged through ongoing projects to construct additional enhanced data sets.	Quality Improvement; Research	Innovation	Acute-Care Hospital
National Core Indicators (NCI)[127]	National Association of State Directors of Developmental Disabilities Services (NASDDDS) and the Human Services Research Institute (HSRI)	A collaborative effort between NASDDDS and HSRI to support. NASDDDS-member agencies in gathering a standard set of performance and outcome measures for tracking performance, comparing results across States, and establishing national benchmarks and serves as a valuable source of information on individuals with developmental disabilities receiving services.	Quality Improvement; Public Reporting; Research	Standards; Patients/ Consumers	Disability Services
Healthcare Effectiveness Data and Information Set (HEDIS) & Quality Measurement[128]	NCQA	A tool developed by NCQA and used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service including measures covering overuse, underuse, value, process, and outcome measures.	Tools/ Products; Payer; Public Reporting	Patients/ Consumers	
The National Council on Independent Living (NCIL) Outcomes Initiative[129]	The National Council on Independent Living (NCIL)	A national membership organization that advances independent living and rights of people with disabilities through consumer-driven advocacy. There are approximately 400 councils on independent living (CILs) throughout the US.	Consumer Engagement; Quality Improvement	Patients/ Consumers	Disability Services

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
National eHealth Collaborative (NeHC)[130]	National eHealth Colla¬borative	A public-private partnership that enables secure and interoperable nationwide health information exchange to advance health and improve health care.	Collaborative	Information Exchange	
Patient Engagement Framework[131]	National eHealth Collaborative	A model created to guide health care organizations in developing and strengthening their patient engagement strategies through the use of eHealth tools and resources. The framework has steps to increase patient engagement through the collection of patient information and integration with electronic health records. This framework informs, empowers and engaged patients. It allows patient provider partnership for care management both in and out of the health care setting.	Training & Technical Assistance	EHR; Patients/ Consumers	
Electronic Quality Measures (eMeasures)[132]	NQF	Standardized performance measures in an electronic format that help ensure that measures are consistently defined, implemented, and compatible across clinical IT systems to promote higher quality and more appropriate care delivery.	Tools/ Products	EHR; Standards	
eMeasure Learning Collaborative[133]	NQF	Seeks to create a learning environment for advancing knowledge and promoting best practices related to developing and implementing eMeasures. By bringing together stakeholders from across the quality enterprise, the Collaborative will help promote more efficient and standardized adoption of eMeasures.	Collaborative; Training & Technical Assistance	EHR; Innovation	
Health IT Expert Panel (HITEP-I)[134]	NQF	A panel assembled by NQF that identified 84 high-priority quality measures, their associated common data types, and a framework to evaluate the quality of electronic information required by performance measures through EHRs. The panel examined the information needed to measure effective health IT use in order to better understand how health IT tools can improve the efficiency, quality, and safety of health care delivery.	Advisory Body; Training & Technical Assistance	EHR; Patient Safety	
Health IT Expert Panel (HITEP-II)[135]	NQF	Continues the work of HITEP-I (see above) by focusing on recommendations for a standardized Quality Data Model (QDM) and more meaningful quality measurement through improved clinical data flows within and across care settings.	Advisory Body; Training & Technical Assistance	Standards; Information Exchange	
Measure Applications Partnership (MAP)[136]	NQF	A public-private partnership convened by the NQF to provide input to HHS on the selection of performance measures for public reporting and performance-based payment programs.	Collaborative; Public Reporting	Payment/ Reimbursement	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Patient Reported Outcomes (PROs) in Performance Measurement[137]	NQF	A project that brought together a diverse set of stakeholders who could facilitate the groundwork for developing, testing, endorsing, and implementing PRO performance measures. PROs have been defined as "any report of the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else." PRO tools enable assessment of patient–reported health status for physical, mental, and social well–being.	Collaborative; Research; Testing	Patients/ Consumers	
Quality Data Model (QDM)[138]	NQF	An "information model" that clearly defines concepts used in quality measures and clinical care and is intended to enable automation of EHR use. Provides a way to describe clinical concepts in a standardized format so individuals (i.e., providers, researchers, measure developers) monitoring clinical performance and outcomes can clearly and concisely communicate necessary information. Describes information so that EHR and other clinical electronic system vendors can consistently interpret and easily locate the data required.	Training & Technical Assistance	EHR; Standards	
Quality Positioning System (QPS)[139]	NQF	A web-based tool designed to help easily find and select NQF-endorsed® measures. QPS Version 1.0 includes new features that provide the most up-to-date information about NQF-endorsed measures.	Tools/ Products	Data Repository	
Improving Quality in Cancer Screening: The Excellence Report for Colonoscopy: (AHRQ EQM Grant)[140]	Oregon Health and Science University	Using the Clinical Outcomes Research Initiative (CORI) software application and the National Endoscopic Database, the project developed and tested the Excellence Report—a quality report card for gastrointestinal endoscopy that focuses on nationally recognized quality process measures for colonoscopy.	Testing; Research	Patient Safety	Ambulatory Care; Cancer
Pharmacy eHealth Information Technology Collaborative[141]	Pharmacy eHealth Information Technology Collaborative	A national professional association of pharmacists and other health care practitioners who serve society by the application of sound medication management principles and strategies to improve health care for all. The Academy's 5,700 members develop and provide a diversified range of clinical, educational, and business management services and strategies on behalf of the more than 200 million Americans covered by a managed care pharmacy benefit	Collaborative	Medication Management	Pharmacy
CMS/Premier Hospital Quality Incentive Demonstration™ (HQID)[142]	Premier	A value-based purchasing project that tracked and measured evidence-based care rates to raise overall quality by an average of 18.6% in five clinical areas over the course of six years.	Research	Payment/ Reimbursement	
The Healthcare Information Technology Collaborative[143]	Premier	A collaborative consisting of more than 200 health systems and hospital chief information officers and more than 300 total participants that share legal and regulatory expertise and best practices on achieving meaningful use of health IT.	Collaborative	Meaningful Use	Acute-Care Hospital

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
The Partnership for Care Transformation™ (PACT) Collaborative[144]	Premier	A collaborative including hospitals and health systems that are building health IT infrastructure that will be needed to foster greater provider accountability, including predictive modeling, cross-continuum claims and clinical information, and transparent information exchange.	Health Information Exchange; Collaborative	Care Coordination; Care Transformation; Information Exchange	Acute-Care Hospital
QUEST: High Performing Hospitals program[145]	Premier	A program that automatically identifies harm and complications, tracks clinical quality measures and provides industry benchmarks.	Quality Improvement	Patient Safety	Acute-Care Hospital
SafetyAdvisor/ Occurrence Report Management (ORM) System[146]	Premier/ Quantros	An enterprise-wide, web-based system that automates incident collection, review, follow-up, and regulatory reporting for health care organizations in real-time. The tool was developed in response to requests from hospital risk management and quality executives and their re-insurers who saw that paper-based incident data collection, review, and follow-up was incomplete, slow, and did not provide the structured framework required to improve patient safety, reduce risk, and put in place workflow changes to prevent adverse incidents before they occur.	Tools/ Products	Patient Safety	Acute-Care Hospital
South Carolina Healthcare Quality Trust (SCHQT)[147]	Premier/Health Sciences South Carolina/South Carolina Hospital Association	A voluntary hospital partnership and collaborative approach that leverages Premier data assets to improve performance and eliminate preventable hospital acquired infections (HAIs).	Collaborative	Patient Safety; Hospital Acquired Infections	Acute-Care Hospital
Puget Sound Health Alliance[148]	Puget Sound Health Alliance	A nonprofit organization consisting of more than 150 leading state and county employers and union trusts, health plans, hospitals and physician groups, government agencies, educational institutions, pharmaceutical companies and individuals aimed to improve health care quality and affordability in a five-county region: King, Kitsap, Pierce, Snohomish and Thurston Counties. The areas of focus are performance measurement, public reporting, performance improvement, consumer engagement and payment reform.	Public Reporting; Consumer Engagement	Patients/ Consumers; Payment/ Reimbursement	
SF36v2 Health Survey[149]	QualityMetric	A 36-question health survey to measure physical and mental health, functional status, and well-being from the patient's point of view in a practicable, reliable and valid manner. Provides scores for each of the eight health domains, and psychometrically-based physical component summary (PCS) and mental component summary (MCS) scores.	Consumer Engagement	Patients/ Consumers	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
National Patient Safety Foundation Grant to Research Safety of Computerized Ordering of Medications1[150]	Quantros/ Brigham and Women's Hospital and Harvard Medical School	A year-long project where Quantros partnered with acute care hospitals who had implemented CPOE. Hospitals transmitted medication data to Quantros, which was then, parsed through quality measures algorithms; metrics were calculated about appropriate medication use and discontinuation. In addition to the hopes of improving quality, the project hoped to lead hospitals in making use of their health IT to track quality performance in a much more efficient manner.	Grant Program; Research	Medication Management; Patient Safety	Acute-Care Hospital
Massachusetts Quality E-Measure Validation Study (AHRQ EQM Grant)[151]	RAND Corporation	Evaluates the readiness of structured EHR data to support ambulatory clinical quality measurement. Using the Ambulatory Care Quality Alliance (AQA) ambulatory care measurement set, the study team is comparing quality measures by applying two standard measurement methods: (1) a "hybrid method," combining claims data with medical record review and (2) a "claims-only method," based upon claims data aggregated across commercial health plans and the Medicare program.	Research; Quality Improvement	EHR; Using Claims Data; Data Aggregation/ Integration	Ambulatory Care; Medicare
Indiana PROSPECT (AHRQ EDM Grant)[102]	Regenstrief Institute	A resource used for a variety of clinical outcomes and clinical effectiveness research. It builds on the Indiana Network for Patient Care (INPC) and will enhance the infrastructure to capture richer clinical data and enhance the ability to incorporate patient outcomes, improve capture of device utilization data, incorporate genomic and other high throughput results, and identify patient for recruitment and enrollment technologies.	Data Repository; Research	Patients/ Consumers	
Consumer-Purchaser Disclosure Project (CPDP)[152]	Robert Wood Johnson Foundation	A coalition of leading national and local consumer organizations, employers, and labor organizations dedicated to improving the quality and affordability of health care in America for consumers and health care purchasers. The project's mission is to share useful information about provider performance to patients so they can make informed choices, to purchasers so they can better reward the best performing providers, and to providers so they can improve the quality of the care they provide.	Grant Program	Patient Safety; Care Transformation; Decisionmaking	
Interactive Preventive Health Record (IPHR) integrated with Electronic Health Record[153]	RTI International; Virginia Ambulatory Care Outcomes Research Network (ACORN); Virginia Commonwealth University Department of Family Medicine	An interactive preventive health record used by patients from 14 medical practices in Virginia to learn about their preventive health needs and access related educational information and tools. Patients sign on to the system before each visit to view health information drawn from the practice's EHR and complete a health risk assessment. The system then generates a summary page that lists the dates of past preventive services and associated test results, highlights missing information, and makes evidence-based recommendations on needed preventive services, thus allowing the patient to discuss these needs with the doctor at the upcoming visit. The patient's information is automatically transmitted back to the EHR, making it easy for clinicians to identify and discuss the patient's preventive care needs during the visit.	Tools/ Products; Consumer Engagement	Patients/ Consumers; EHR; Data Aggregation/ Integration	Primary Care; Ambulatory Care

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Center for Technology and Aging (CTA)[154]	The Scan Foundation	A national leader in the use of patient-centered technologies for older adults that works with health care providers, aging service organizations, payers, foundations and technology companies to enable them to accelerate the deployment of proven technologies.	Grant Program; Quality Improvement	Patients/ Consumers; EHR	Aging Services
Shared Care Plan[155]	Shared Care Plan	A free, easy-to-use record that lets patients organize and store vital health information. It is also a self-management care plan that helps improve patients' understanding of their health and helps them manage chronic conditions, coordinate the care of others, and improve health.	Tool/Product	Patients/ Consumers	
Comparative Outcomes Management with Electronic Data Technologies (COMET) (AHRQ EDM Grant)[102]	Stanford Sleep Medicine Center	A project to develop a new electronic data network infrastructure that will prospectively enable access to and the sharing of clinical and research data between four Clinical Centers (CCs). The development of this new, broad, scalable, and sustainable electronic data network will enable the collection of longitudinal data content (both digital and physical) by each of the four CCs.	Tools/ Products	Information Exchange	
Hudson Valley Initiative[156]	Taconic IPA, Taconic Health Information Network and Community (THINC), MedAllies	Revolutionizes health care delivery through the work of three organizations that share a common vision which is to leverage health information technology, physician practice transformation and value-based purchasing in the pursuit of care delivery that is patient-centered, coordinated, accessible, high quality, and efficiently delivered through sustainable financial models.	Health Information Exchange	Data Aggregation/ Integration; Information Exchange	
QualityMetric[157]	The UnitedHealth Group	A group that works with both large and small health care organizations to measure and better understand health outcomes. QualityMetric worked with Specialty Group, a large specialty health care manager for behavioral health, diagnostic imaging, and specialty pharmaceutical whose primary customers are US health insurers, government agencies, and other payers, to develop a system that uses standardized and scientifically valid measures. Quality Metric also partnered with Canadian Health Authority to implement a population health initiative that monitors health outcomes in patients enrolled in community based diabetes and obesity management and education programs.	Quality Improvement; Payer; Public Health	EHR; Payment/ Reimbursement	Diabetes; Behavioral Health; Pharmacy
The Patient Cost Estimator (myHCE)[158]	The UnitedHealth Group	An integrated online service that helps consumers find quality care while being able to estimate the cost of more than 100 common treatments and procedures. Estimates are also personalized to reflect an individual's own health plan benefits, including real time account balances.	Tools/ Products; Payer	Patients/ Consumers; Decisionmaking	

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
The Premium Designation Program[159]	The UnitedHealth Group	Recognizes specialty and primary care physicians and hospitals that provide cardiac services that have been assessed as meeting or exceeding certain evidence and consensus based quality and efficiently criteria. Evaluates hospitals and doctors in 21 specialties, including primary care, internal medicine, cardiology, orthopedic surgery, OB/GYN, pediatrics, based on industry standards, evidence-based and medical society standards and guidelines from medical organizations and governmental agencies (e.g., ACQA, NCQA, and the American College of Cardiology).	Quality Improvement; Payer; Incentive Program	Payment/ Reimbursement	Cardiac Care; Primary Care; Ambulatory Care
View360™[160]	The UnitedHealth Group	Provides evidence-based medical information to contracted physicians via an online portal to help identify patients who may be candidates for specific treatments or screenings, consistent with national quality guidelines.	Quality Improvement; Payer	Decisionmaking	
Scalable Architecture for Federated Translational Inquiries Network (SAFTINet) (AHRQ EDM Grant)[102]	University of Colorado Denver	A research project to enhance the capacity and capability of a safety net-focused distributed research network to conduct prospective comparative effectiveness research (CER) via a multi-setting, multi-state organization. Will federate geographically dispersed safety net entities that collectively serve markedly diverse underserved populations and will both leverage and extend the established governance and technologic capabilities of the Distributed Ambulatory Research in Therapeutics Network (DARTNet) to allow more flexible options for participants and improved grid technology. This multi-state project will allow researchers, health policy experts, payers, and clinicians to better understand the impact of a wide variety of health care interventions on health outcomes for minority, underserved and socioeconomically disadvantage populations by supporting CER.	Research; Quality Improvement	Information Exchange	Underserved Populations
Crossing the Quality Assessment Chasm: Aligning Measured and True Quality of Care (AHRQ EQM Grant)[161]	University of Pennsylvania	Leverages detailed and discrete data from electronic medical records to develop measures that account for heterogeneity among different diabetic patient panels, credit improvement in the control of diabetes among individuals in a given population over time, recognize provider effort in medical management, and incorporate management of diabetes comorbidities, such as high blood pressure and hyperlipidemia.	Quality Improvement; Research	EHR	Diabetes

Name	Organization	Description	Functional Tag	Topical Tag	Special Tag
Scalable National Network for Effectiveness Research (SCANNER) (AHRQ EDM Grant)[102]	University of Southern California	A secure, scalable, distributed infrastructure that facilitates collaborative comparative effectiveness research (CER) among widely dispersed institutions and provides flexibility to participant sites as a means for data sharing. This flexibility will be implemented by allowing codification of data sharing policies—each institution will specify its own policies. SCANNER will connect diverse health care delivery settings with secure infrastructure that utilizes data collected at the point of care. The network will have a main node that manages policies, distributes queries, aggregates results, and maintains trust and security (authentication, authorization, auditing, etc.). Each site will maintain a node that contains data from that site.	Tools/ Products; Research	Data Aggregation/ Integration; Information Exchange	
Using Electronic Records to Detect and Learn From Ambulatory Diagnostic Errors (AHRQ EQM Grant)[162]	University of Texas Health Science Center Houston	Uses data from Veterans Affairs' (VA) EHRs and a non-VA primary care network to detect diagnostic errors and understand their causes. Lays the groundwork for future prevention strategies.	Research	EHR	Veterans; Ambulatory Care; Primary Care
Surgical Care and Outcomes Assessment Program CER Translation Network (SCOAP CERTAIN) (AHRQ EDM Grant)[102]	University of Washington Medicine	A learning health care system focused on improving the effectiveness, quality, and safety of surgical and interventional care. Leverages the success of the SCOAP registry to improve existing use of data for quality improvement (QI) and to extend the registry into comparative effectiveness research (CER). Incorporates patient voices, stakeholder perspectives, and real world clinical practice to address questions of comparative benefit and costs for clinicians, patients, payers, industry, and policymakers. Builds on an automated flow of electronic health information using cutting edge informatics tools and evaluates the use and value of automated data retrieval from across diverse health care settings including the use of novel text mining tools.	Quality Improvement; Training & Technical Assistance; Tools/ Products; Research	Data Repository; Patients/ Consumers; Patient Safety	
Surveillance for Adverse Drug Events (ADE) in Ambulatory Pediatrics (AHRQ EQM Grant)[163]	Washington University	Develops and disseminates health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management. Uses automated surveillance to measure the incidence of outpatient ADEs suffered by children with sickle cell disease, cystic fibrosis, or cancer, either in the emergency department (ED) or during the transitions between hospital admission and discharge. Analyzes data generated from BJC HealthCare system, which includes the St. Louis Children's Hospital.	Research; Public Health	Decisionmaking; Care Coordination; Data Aggregation/ Integration	Ambulatory Care; Cancer

Tags Used:

Functional	Topical	Special
Advisory Body	Care Coordination	**Care Setting/Service Type**
Beacon Communities	Care Transformation	Acute Care Hospital
Care Provider	Data Aggregation/Integration	Ambulatory Care
Collaborative	Data Repository	Community Health Centers
Consumer Engagement	Decisionmaking	Laboratory
Data Repository	EHR (General)	Patient Centered Medical Home
Grant Program	EHR Adoption/Implementation	Pharmacy
Health Information Exchange	Hospital Acquired Infections	Post acute Care
Incentive Program	Information exchange	Primary Care
Measures Clearinghouse	Innovation	**Disease/Condition Specific**
Payer	Meaningful Use	Asthma
Public Health (to include Population Health)	Medication Management	Behavioral Health
Public Reporting	Patient Safety	Cancer
Quality Improvement	Patients/Consumers	Cardiac Care
Research	Payment/Reimbursement	Diabetes
Testing	Standards	HIV
Tools/Products (IT specific)	Telemedicine	**Special Populations**
Training & Technical Assistance (to include best practices, educational tools, resources, and sessions)	Using Claims Data	Aging Services
		Disability Services
		Medicaid
		Medicare
		Native Americans
		Rural Health
		Disadvantaged Populations
		Veterans

Appendix D. List of Focus Group Participants and RFI Respondents

D.1. Focus Group Participants

AHRQ would like to thank the following individuals for their valuable insights as participants in our focus groups. Their thoughtful deliberations and recommendations helped frame this report.

Please note, however, that content of the report should not be construed to reflect the opinions of any one individual or consensus among contributors; it cannot be assumed that all contributors agree with all findings illuminated in this report. Furthermore, individuals participated as independent experts, not on behalf of their organizations; organizational endorsement should not be assumed.

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D.2. RFI Respondents

AHRQ would also like to thank the following individuals for their thoughtful RFI responses which provided a wealth of information that guided the selection of topics most critical to explore in focus groups.

Please note that although organizational affiliation is listed for reference, organizational endorsement should not be assumed as it was often unclear as to if individuals were responding independently or on behalf of their organizations. Credentials are also included where available, but may be incomplete. Concurrence with all items in this paper cannot be assumed as RFI respondents often diverged on opinions, perspectives, and recommendations.

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Appendix E. Additional Resources

Over the course of research, several Web sites were identified as offering additional information, opportunities for collaboration, implementation tools, and various training and technical assistance. Exhibit E-1 below is not exhaustive, but is a sample of some of the many resources identified during the research process. Stakeholders are encouraged to explore and collaborate through a wide variety of available resources. Further, AHRQ does not intend to imply endorsement of all information contained within these pages since most of these Web sites are not maintained by AHRQ.

Exhibit E-1. Listing of Additional Resources for Information and Collaboration

Organization	Key Reference Sites
Agency for Healthcare Research and Quality (AHRQ)	▪ Findings and Lessons Learned From the Improving Quality Through Clinical Use of Health IT Grant Initiative ▪ Findings From the Transforming Healthcare Quality Through IT (THQIT) Grants ▪ Health IT-Enabled Quality Measurement ▪ National Resource Center for Health IT ▪ National Web Conference on Translating Electronic Data Into Better Quality Care ▪ Studer Group Toolkit: Patient Safety ▪ Working for Quality (National Quality Strategy) ▪ USHIK Meaningful Use Portal ▪ USHIK Standards Portal
Centers for Medicare and Medicaid Services (CMS)	▪ CMS Quality Measures ▪ EHR Incentive Program ▪ Measures Management System ▪ Nursing Home Quality Initiative ▪ Home Health Quality Initiative
Consumer-Purchaser Disclosure Project	▪ Publications Library
The eHealth Initiative (eHI)	▪ eHealth Initiative Resource Center ▪ HIE Toolkit
Health Resources and Services Administration (HRSA)	▪ Health Information Technology and Quality Improvement
Health Information and Management Systems (HIMSS)	▪ HIMSS Blog ▪ HIMSS Events ▪ The HIMSS Health IT Value Suite ▪ HIMSS Resource Library
Informed Medical Decisions Foundation	▪ Center for Shared Decision Making
Institute of Medicine of the National Academies (IOM)	▪ Best Care at Lower Cost: The Path to Continuously Learning Health Care in America (2012) ▪ Core Measurement Needs for Better Care, Better Health, and Lower Costs: Counting What Counts: Workshop Summary (2013) ▪ Patient Engagement Meeting Video

Organization	Key Reference Sites
National eHealth Collaborative	▪ The Patient Engagement Framework ▪ Resource Center
National Quality Forum (NQF)	▪ eMeasure Learning Collaborative ▪ Measures, Reports, and Tools
Office of the National Coordinator for Health IT (ONC)	▪ Health IT Patient Safety Action and Surveillance Plan ▪ Health IT Policy Committee, Quality Workgroup ▪ Long Term and Post-Acute Care ▪ Nationwide Health Information Exchange Resources ▪ Principles and Strategy for Accelerating Health Information Exchange and Advancing Interoperability Webinar ▪ Regional Extension Centers ▪ Research Collaboratives ▪ Research & Innovation to Enhance Health IT ▪ The Standards and Interoperability (S&I) Framework
Patient-Centered Outcomes Research Institute (PCORI)	▪ Past Meetings and Events