

THE NATIONAL QUALITY FORUM

TO: NQF Members

FR: NQF Staff

RE: Review of the Health Information Technology Expert Panel Report *Health IT Enablement of Quality Measurement – the Quality Data Set (QDS) and Dataflow*

DA: June 9, 2009

Performance assessment requires consistent measurement across conditions, settings, and providers. Efficient measurement must automatically gather reliable, high quality clinical information from numerous electronic sources. As noted in the first Health Information Technology Expert Panel (HITEP) report, collecting and reporting accurate, comparative healthcare performance data is complex and largely a time consuming, manual process.

Between February and May 2009, The National Quality Forum with support from the Agency for Healthcare Research and Quality reconvened HITEP and two workgroups to accelerate ongoing efforts to define how health information technology (IT) can evolve to effectively support performance measurement. HITEP II was tasked with drafting a quality data set (QDS) and dataflow framework to empower automated, patient-centric, longitudinal quality measurement.

The draft document, *Health IT Enablement of Quality Measurement – the Quality Data Set (QDS) and Dataflow*, is posted on the NQF web site, www.qualityforum.org, under “HITEP-II.” As this effort is not a traditional NQF Consensus Development Project (CDP), this draft document is being provided for purposes of review and comment only; there will not be voting.

NQF is now using a program that facilitates electronic submission of comments on this draft report. You may post your comments and view the comments of others on the NQF website. **All comments should be submitted using the online submission process.** Supporting documents related to your comments may be submitted by email to HITEP2@qualityforum.org with “*QDS and Dataflow*” in the subject line and your contact information in the body of the email.

NQF Member comments must be submitted no later than 6:00 pm ET, July 7, 2009; public comments are due by 6:00 pm ET, June 30, 2009.

Thank you for your interest in the NQF’s work. We look forward to your review and comments.

**THE NATIONAL QUALITY FORUM
HEALTH INFORMATION TECHNOLOGY EXPERT PANEL REPORT**

**HEALTH IT ENABLEMENT OF QUALITY MEASUREMENT:
QUALITY DATA SET (QDS) AND DATAFLOW**

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I. EXECUTIVE SUMMARY

The National Quality Forum (NQF) with support from the Agency for Healthcare Research and Quality (AHRQ) established the Health Information Technology Expert Panel (HITEP) to accelerate ongoing efforts defining how health information technology (IT) can evolve to effectively support performance measurement.¹ As noted in the HITEP report, collecting and reporting accurate, comparative healthcare performance data is complex and largely a time consuming, manual process. The 2008 HITEP report recommended 11 data categories and 39 data types for a set of 84 high priority performance measures to enhance capabilities for the electronic capture of data for quality measurement. This information has been incorporated by the Healthcare Information Technology Standards Panel (HITSP) into updates to the Quality Interoperability Specification and the HITSP components to which it refers.² HITSP specifically identified an electronic source and a standard code set for each data category and datatype in the HITEP report. Many of these requirements have also been incorporated into certification requirements for EHRs by the Certification Commission for Health Information Technology (CCHIT).³

The first HITEP report led to new feasibility criteria for measure endorsement by NQF. However, quality measure specifications currently do not leverage EHR systems. Many rely heavily on administrative rather than clinical data, and clinical information required for quality measurement is not adequately captured in EHRs. The American Recovery and Reinvestment Act (ARRA) has significantly raised the bar by providing funding to support the adoption of qualified electronic health records. The act specifically defines meaningful use of health IT systems as the use of electronic prescribing, the electronic exchange of health information to improve the quality of

¹ National Quality Forum. Health Information Technology Expert Panel Report: Recommended Common Data Types and Prioritized Performance Measures for Electronic Healthcare Information Systems. 2008. Available at: <http://www.qualityforum.org/projects/ongoing/HITEP1/>.

² HITSP is a cooperative partnership between the public and private sectors for the purpose of achieving a widely accepted set of performance standards to enable widespread interoperability among healthcare software applications. HITSP Interoperability Specifications for Quality, "IS 06." Available at: <http://www.hitsp.org/>

³ CCHIT was created by the HHS Office of the National Coordinator for HIT (ONCHIT) to oversee private sector certification of HIT products.

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53 health care, such as promoting care coordination, and the submission of information on clinical
54 quality measures.

55
56 To resolve these gaps, HITEP reconvened, tasked with drafting a quality data set (QDS) to
57 empower automated, patient-centric, longitudinal quality measurement. Performance
58 assessment requires consistent measurement across conditions, settings, and providers. Efficient
59 measurement must automatically gather reliable, high quality clinical information from numerous
60 electronic sources. Based on the results of an environmental scan, the HITEP had a clear mandate
61 that measures must be more clearly and consistently defined, that structured data and reuse of
62 data elements that exist in EHRs or other electronic formats is essential, and that workflows are
63 complex. It is also clear from the report that authoritative data required to capture the meaning
64 of elements within the measure can be found in specific medical record locations. The HITEP
65 therefore created two workgroups, QDS and Dataflow. The QDS workgroup standardized data
66 elements and developed a framework to consistently use standard code sets and code lists. The
67 Dataflow workgroup addressed how to determine from its use within the clinical workflow that
68 any given data element is the authoritative source for the information required. The Dataflow
69 workgroup created a framework of characteristics to represent data used within measures based
70 on their representation within EHRs.

71
72 The QDS framework contains three levels of information: *standard elements, quality data*
73 *elements, and dataflow attributes*. *Standard elements* represent the atomic unit of data identified
74 by a data element name, a code set, and a code list comprised of one or more enumerated values.
75 Examples include diabetes and all pertinent ICD-9CM codes, or diabetes medications and all
76 representative medications coded in the code type RxNorm. Standard data elements can be
77 reused within other quality data elements. Each standard element's *category* defines the code set
78 used. *Quality data elements* are pieces of information used in quality measures to describe part of
79 the clinical care process. Examples include active diabetes diagnosis, diabetes family history,
80 diabetes medication dispensed, diabetes medication administered. Quality data elements can be

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81 reused by other measures, clinical guideline and CDS developers. The *quality datatype* is a
82 grouping of information that indicates the circumstance of use for any individual standard
83 datatype. Examples include active diagnosis, family history of diagnosis, medication prescribed.
84 *Dataflow attributes* describe the authoritative source for the information required to represent
85 any given quality data element. Dataflow attributes include the *data source, recorder, setting, and*
86 *health record field*. The *source* is the originator of the quality data element and may be an
87 individual or a device. The *recorder* is the individual or device that enters the data element into a
88 health record field and may be the same as the source of the data, but that is not necessarily true.
89 The *setting* is the physical location at which the data element is captured, defining the encounter
90 location during which the data are expected to originate. The *health record field* is the location
91 within an electronic record where the data should be found. Detailed examples of each of these
92 elements are provided in the report. The text uses a sample measure to show how each element
93 of the framework is used to construct the measure.

94

95 The report provides a list of QDS elements and dataflow attributes identified by the HITEP. Two
96 example measures are also presented with suggestions regarding retooling modifications to
97 modify them from the requirement for abstraction to an electronic format. One is based on the
98 ambulatory setting, antiplatelet therapy for coronary artery disease, and the other inpatient
99 based, venous thromboembolism prophylaxis.

100

101 The HITEP concluded with nine recommendations for further work to enhance the development
102 and use of the QDS and electronic data sources:

103

104 *Recommendation 1*: NQF should communicate with, seek buy-in, educate and train the quality
105 measure supply chain (e.g., study designers, guideline developers, quality measure developers,
106 performance reporting consumers, EHR vendors, CDS developers) regarding the QDS and its
107 associated tools.

108

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109 *Recommendation 2:* A measure authoring tool should be created for quality measure developers
110 that can also be used as a resource by the quality measure stakeholders and through which gaps
111 and feedback can be communicated

112
113 *Recommendation 3:* Roles, responsibilities, and opportunities of stakeholders in the quality
114 measure ecosystem should be enumerated (e.g., ONC, CCHIT, CMS, HITSP, vendors, providers,
115 measure developers, guideline developers)

116
117 *Recommendation 4:* QDS should be hosted in a publicly available site. Its contents (quality
118 measures and definitions) should (continue to) be maintained by the measure developers. Over
119 time, NQF should incorporate use of the QDS as part of the measurement endorsement process.

120
121 *Recommendation 5:* A timeline for QDS implementation should be set, enumerating the essential
122 activities and stakeholders.

123
124 *Recommendation 6:* Resources should be provide to measure developers to retool and test high-
125 priority measures specified for HIT-sensitive measures using the QDS

126
127 *Recommendation 7:* Future quality data requirements should use the national priorities and goals
128 as a guide

129
130 *Recommendation 8:* NQF should work with other stakeholders in the quality measure ecosystem
131 to leverage existing standards work regarding preferred taxonomies (SNOMED-CT, LOINC,
132 RxNorm) and models (EHR functional model, RIM).

133
134 *Recommendation 9:* Comparative testing should be performed to better understand differences in
135 performance by mode of data collection, including the use of electronic health records.

136

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137 Although outside of the original scope of work requested by AHRQ, the HITEP committee agreed
138 that it would be timely and appropriate for NQF to offer an approach to the measurement of
139 meaningful use. Next steps include the development and approval of a set of *HIT-sensitive criteria*
140 that can be used to identify clinical performance measures that highlight the effect of meaningful
141 use of HIT. The “HIT-sensitive criteria” can be used to highlight measures that demonstrate the
142 effect of use of core HIT functions on clinical quality:

- 143 • e-Prescribing
- 144 • Preventive services reminders
- 145 • Health information exchange
- 146 • Clinical decision support

147 The HIT-sensitive criteria can be used to systematically review the NQF portfolio of endorsed and
148 pipeline measures to identify a starter set of HIT-sensitive measures that highlight meaningful HIT
149 use in topical areas related to national priorities and high impact conditions. Working with a
150 cadre of measure developers, NQF can further retool HIT-sensitive measures to conform to EHR-
151 based specifications.

152
153 Future work includes the ongoing maintenance of the QDS, maintenance of reusable code lists
154 and the development of a measure authoring tool to enable more facile incorporation of QDS into
155 the quality measurement development process. Additionally, further coordination with standard
156 development organizations and EHR certification bodies is required to encourage greater quality
157 datatype migration into EHRs.

158
159 The HITEP QDS and dataflow frameworks will provide significant advancement in the
160 development of quality measures. It will also provide a glide path for the incorporation of quality
161 data elements more consistently based on standards into EHR products and implementations.
162 The QDS is not static, rather the framework creates a dynamic product that will enable versioning,
163 growth and expansion to enable future needs for measurement, clinical decision support and
164 guideline implementation.

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165 **II. INTRODUCTION**

166

167 **Background**

168 In 2007 the Agency for Healthcare Research and Quality (AHRQ), at the request of the American
169 Health Information Community (AHIC) Quality Workgroup, contracted with the National Quality
170 Forum (NQF) to address the ability of electronic records to create and aggregate data for quality
171 measurement. For this purpose, NQF established the Health Information Technology Expert Panel
172 (HITEP) to accelerate ongoing efforts defining how health information technology (IT) can evolve
173 to effectively support performance measurement.⁴ As noted in the HITEP report, collecting and
174 reporting accurate, comparative healthcare performance data is complex and largely a time
175 consuming, manual process. The vast majority of electronic health information readily available
176 for quality measurement remains administrative, claims-based data, which includes only limited
177 clinical information. Quality improvement leaders have long recognized that the widespread
178 adoption of health IT will automate and simplify these processes by providing electronic
179 information. Electronic health record (EHR) systems have long been identified as a fundamental
180 HIT tool to collecting high-quality electronic clinical information.^{5,6,7} The AHIC Quality Workgroup
181 specified further recommendations, “The National Quality Forum, through its endorsement
182 process, should apply criteria that reinforce the use of standardized data elements in measures to
183 allow quality measures to be embedded in EHRs. The NQF may do so by incorporating such
184 criteria into its endorsement criteria for new measures.”

185

186 The American Recovery and Reinvestment Act (ARRA) has significantly raised the bar, providing
187 funding to support the adoption of qualified electronic health records. Such a qualified system is
188 defined by the act as an electronic record of health-related information on an individual that—

⁴ National Quality Forum. Health Information Technology Expert Panel Report: Recommended Common Data Types and Prioritized Performance Measures for Electronic Healthcare Information Systems. 2008. Available at: <http://www.qualityforum.org/projects/ongoing/HITEP1/>.

⁵ National Quality Forum. Information Technology and Healthcare Quality: A National Summit. Washington, DC: NQF; 2003.

⁶ Corrigan J, Greiner A, and Erickson S. Fostering Rapid Advances in Health Care. Washington, DC: National Academies Press; 2002.

⁷ National Committee on Vital and Health Statistics. Information for Health: A Strategy for Building the National Health Information Infrastructure. Washington, DC: Department of Health and Human Services; 2001.

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189 “(A) includes patient demographic and clinical health information, such as medical history and
190 problem lists, and (B) has the capacity— (i) to provide clinical decision support, (ii) to support
191 physician order entry, (iii) to capture and query information relevant to health care quality, and
192 (iv) to exchange electronic health information with, and integrate such information from other
193 sources.”⁸[ARRA H.R. 1–115] The ARRA further defines meaningful use of health IT systems as (a)
194 using certified EHR technology in a meaningful manner, which shall include the use of electronic
195 prescribing, (b) the electronic exchange of health information to improve the quality of health
196 care, such as promoting care coordination, and (c) submit information in a form and manner
197 specified by the Secretary of the Department of Health and Human Services (DHHS), on such
198 clinical quality measures and such other measures as selected by the Secretary. The act further
199 requires the Secretary to seek to improve the use of electronic health records and health care
200 quality over time by requiring more stringent measures of meaningful use. [ARRA H.R. 1–356]

201
202 The 2008 HITEP report recommended 11 data categories and 39 data types for a set of 84 high
203 priority performance measures to enhance capabilities for the electronic capture of data for
204 quality measurement. This information has been incorporated by the Healthcare Information
205 Technology Standards Panel (HITSP) into updates to the Quality Interoperability Specification and
206 the HITSP components to which it refers.⁹ HITSP specifically identified an electronic source and a
207 standard code set for each data category and datatype in the HITEP report. Many of these
208 requirements have also been incorporated into certification requirements for EHRs by the
209 Certification Commission for Health Information Technology (CCHIT).¹⁰

210

⁸ US Congress. American Recovery and Reinvestment Act of 2009, 17 February 2009. Available at:
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf.

⁹ HITSP is a cooperative partnership between the public and private sectors for the purpose of achieving a widely accepted set of performance standards to enable widespread interoperability among healthcare software applications. HITSP Interoperability Specifications for Quality, “IS 06.” Available at: <http://www.hitsp.org/>

¹⁰ CCHIT was created by the HHS Office of the National Coordinator for HIT (ONCHIT) to oversee private sector certification of HIT products.

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211 Since the publication of the first HITEP report, challenges remain connecting the dots between the
212 electronic information and quality measurement. HITEP identified the following gaps in
213 automating quality measurement:

- 214 • quality measurement specifications are not designed to leverage EHR systems,
- 215 • quality measurement specifications rely heavily on administrative rather than clinical data,
216 and
- 217 • clinical information required for quality measurement is not adequately captured in EHRs

218
219
220 To resolve these gaps, HITEP reconvened, tasked with drafting a quality data set (QDS) to
221 empower automated, patient-centric, longitudinal quality measurement. Performance
222 assessment requires consistent measurement across conditions, settings, and providers. Efficient
223 measurement must automatically gather reliable, high quality clinical information from numerous
224 electronic sources. The task included a review of existing data sets including those used in
225 currently endorsed measures, those developed by the Centers for Medicare and Medicaid
226 Services (CMS) for its CARE tool, by the HITEP in its initial work, and by The Joint Commission for
227 transfers of care. The QDS is intended to include relevant data captured during inpatient and
228 ambulatory office visits as well as data required to support transitions of care between settings.
229 HITEP was also tasked to gather, synthesize and refine clinical workflow maps, focusing on care
230 processes related to the care underlying the conditions targeted by the previously prioritized set
231 of measures. The panel was asked to determine mechanisms and opportunities within these
232 workflows for identifying patients who are eligible for inclusion in the measure populations, for
233 gathering performance measurement data, and for providing clinical decision support to optimize
234 performance in targeted areas. As noted in the environmental scan referenced below, workflow
235 maps are neither standardized nor consistently used and workflow varies for many reasons from
236 one organization to another. Therefore, the HITEP elected to address how to determine that any
237 given data element is the authoritative source for the information required. Using authoritative
238 characteristics allows local processes to capture needed information. Thus, these characteristics

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239 are the links to enable clinical workflow based on local infrastructure. This report will describe
240 these characteristics as *dataflow*.

241
242 The goal of this effort is to represent quality data requirements (concepts, data types, data
243 elements, and sets of values or codes) unambiguously and specifically. The first step was to begin
244 with data requirements from measure stewards with existing NQF endorsed measures. For
245 composite and longitudinal measures, the QDS must also include cross-cutting, longitudinal
246 quality concepts such as patient preference and functional status, and structural measures that
247 require data from disparate information systems. The structure of the QDS must be simple to
248 understand and sufficiently robust to incorporate information about each element such that it can
249 be reused without ambiguity with respect to meaning. The structure must also include
250 capabilities for versioning and expansion to include future measure data requirements using
251 electronic data across settings.

252
253 Standardizing quality measures will help automate successful measurement. Yet the volume and
254 variety of existing measures in paper-format slows standardization. For example, at the time of
255 this publication, the NQF Endorsed Measures Database contains 511 measures; Centers for
256 Medicare and Medicaid Services (CMS) Quality Measure Information System (QMIS) contains 362
257 measures; and, the Agency for Healthcare Research and Quality (AHRQ) National Quality
258 Measures Clearinghouse (NQMC) contains 1,778 measures.

259
260 Decomposing a complex problem can provide more feasible solutions. All measures require
261 numerous individual pieces of information to perform a calculation (e.g. “aspirin allergy,” “beta-
262 blocker prescribed,” “diabetes active diagnosis”). However, the process of standardization begins
263 with identifying and standardizing this list of individual quality concepts resulting in the Quality
264 Data Set (QDS). The American Health Information Community (AHIC) Quality Workgroup
265 recommended further development of quality information categories from HITEP-I into the QDS.
266

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267 Standardization will help us speak and understand the same quality language. Currently, those
268 who use quality measurement in their clinical practices are burdened by new or updated
269 measures. Each new measure requires learning a new dialect. With standardization, we can use
270 the same words, just in new sentences.

271
272 Although standards enable information sharing, the number of participants and complexity of
273 information in the quality conversation limits the feasibility of measurement. Electronic clinical
274 information comes from many containers including Electronic Health Records (EHR), Health
275 Information Exchanges (HIE), Personal Health Records (PHR), Laboratory Information Systems
276 (LIS), and Pharmacy Benefits Managers (PBM). Although much of the information in these systems
277 is stored in a standard manner, there is significant variability between systems. As a result, quality
278 measures currently can not communicate directly with all of these electronic containers, resulting
279 in laborious manual abstraction. While various efforts are underway to further align and share
280 information between containers, AHIC recommended HITEP address workflow issues getting
281 information between the containers and quality measurement. The QDS contains the concepts,
282 the “what,” and the quality measures need to contain information from whom and where the
283 information is gathered.

284

285 The report is divided into the following sections:

286

- 287 1. Environmental scan of HIT within quality measurement
- 288 2. Structure of QDS
- 289 3. Quality datatypes for QDS
- 290 4. A populated starter QDS with elements required for measurement
- 291 5. Recommendations for housing, maintenance and oversight of QDS
- 292 6. Recommendations for dataflow structure to enable the QDS

293

294 **III. ENVIRONMENTAL SCAN**

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295
296 NQF contracted with Booz Allen Hamilton (BAH) to conduct an environmental scan of current
297 initiatives that use electronic clinical data in quality measurement and improvement initiatives.
298 The goal of the environmental scan was to characterize current efforts that are using electronic
299 clinical data to measure performance, to identify areas in which electronic data standards for
300 structured clinical data are needed, and to share this information with the HITEP to inform their
301 efforts to conceptualize and define a quality data set (QDS) and a work flow framework. BAH
302 used a two-pronged approach to conduct the environmental scan including a literature review of
303 published data and grey media and primary data collection through targeted interviews. 20
304 organizations were interviewed including 9 provider organizations (large and small), 10
305 collaboratives and 2 government organizations. An interview guide was used to structure the
306 hour-long interviews.

307
308 Most interviewees used the Centers for Medicare and Medicaid Services (CMS) Reporting Hospital
309 Quality Data for Annual Payment (RHQDAPU) measures, Ambulatory Quality Alliance (AQA)
310 measures, and the Healthcare Effectiveness Data and Information Set (HEDIS) measures. Some
311 organizations modified these widely-used measures, especially in the ambulatory setting. Changes
312 included adjustments to denominators to capture information on particular patient populations
313 (e.g., patients over 55 years of age) or to enhance automation. Payors/Collaborators altered
314 measures to meet program goals. Composite measures were created from AQA/HEDIS
315 component measures. A few organizations reported developing home-grown measures. One
316 organization (Indian Health Service) developed measures that could be collected electronically via
317 their system-wide EHR. Significant issues not addressed by existing nationally-recognized
318 measures, included particular aspects of care (e.g., safety, mental health, care
319 coordination/transitions of care, care episodes, and efficiency (e.g., patient flow). Areas often
320 reported as missing data include specialty care due to the use of proprietary registries which are
321 expensive for organizations to access, and disparities as data on race and ethnicity are not always
322 captured.

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323

324 Technical limitations for measure implementation include the lack of measure specifications
325 designed for electronic capture of data, and that some elements are typically not captured in
326 structured format or by interoperable system components (e.g., imaging studies outside the
327 provider’s electronic network). Reference lab data was also challenging without data-sharing
328 agreements in place. Still other information is generated outside the healthcare infrastructure
329 such as cash transactions to purchase over-the-counter medications. Care that takes place in
330 employer-based wellness clinics was also difficult to access.

331

332 Resource burdens challenged virtually all stakeholders with a need to engage in some manual
333 chart abstraction and data collection. Costs associated with electronic data collection was also a
334 burden based on requirements to upgrade EHRs to capture new data elements as specifications
335 are updated or new measures added. Some required external vendors to extract data from EHRs
336 (providers) or to aggregate data from multiple sources (collaboratives).

337

338 Workflow maps were viewed as valuable for standardizing collection of data elements for quality
339 measurement. Although two large provider organizations were beginning to develop such maps
340 and one organization encouraged individual facilities to document, there was no single standard.
341 Many organizations cited the burden of creating work flows especially due to individual provider
342 preference. Hence, few organizations had created workflow maps.

343

344 There were many sources of data, including electronic and paper-based, such as administrative
345 and financial systems, paper charts/medical records, EHRs, and external health IT systems (e.g.,
346 lab, pharmacy). The inherent nature of some measures (e.g., CMS RHQDAPU) necessitated
347 manual chart abstraction. In most cases, clinical judgment was seen as necessary based on the
348 measure definitions (e.g., bloodstream infections (BSI)--need to determine the cause of a positive
349 culture). Multiple sources used included clinical data from providers—in both electronic and

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350 paper formats, claims data, reference laboratory data, pharmacy benefit managers (PBMs) and
351 others. Some had available State registries or other administrative data sources.

352
353 Data audit and validation was seen as vital due to the complexity of the measure specifications.
354 Except for the organizations that were able to utilize a common technology platform, auditing and
355 validation were largely manual processes.

356
357 The environmental scan identified a number of issues to inform the HITEP work effort.
358 Stakeholders recognized challenges to extracting quality measures from EHRs such as low EHR
359 adoption, privacy and security issues, inability to identify patients consistently across care
360 settings, methodologies to attribute patients to providers for accountability purposes, and the
361 need for data sharing agreements to enable data sharing. The respondents recognized the
362 complexity of data capture and use for measurement. Therefore they recommended prioritizing
363 data categories for standardization to provide basic, high quality information for measurement
364 including laboratory data, medications, patient medical and surgical history, immunization data,
365 diagnostic test data, allergy data, co-morbidities, contraindications, functional status, biologics
366 (e.g. blood pressure) and discharge summary. The stakeholders further suggested standardization
367 of functions within EHRs to enhance interoperability and measurement, including data capture,
368 automated exclusion criteria assessment, time and date stamping, and clinical decision support.
369 Additional standardization work was recommended in the areas of specialty care, continuity of
370 care, episodes of care and longitudinal assessment, chronic conditions, patient satisfaction,
371 disparity assessment, preventative services, pediatric care (well child care), behavioral health and
372 other areas prioritized by the National Priorities Partnership.

373
374 Some basic healthcare infrastructure requirements were also identified, specifically a of a
375 universal patient identifier or standard patient matching algorithms to track a patient across care
376 settings and different electronic data systems, standardized algorithms to attribute patient care to
377 the accountable provider, methodology for expanded query capabilities, data mining and

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378 improved data extraction functionality. From the standpoint of measurement, respondents
379 preferred a standard specification format designed to be used with clinical health IT systems,
380 population measures such that a single patients have less of an impact (e.g. blind patient without
381 eye exam, no pap smear because of hysterectomy), a standard measure release cycle to help EHR
382 vendors establish a schedule of upgrades, minimizing disruption to care delivery that currently
383 occurs given the need for almost continuous EHR maintenance and upgrades

384
385 In summary, the environmental scan provides a clear message that measures must be more
386 clearly and consistently defined, that structured data and reuse of data elements that exist in
387 EHRs or other electronic formats is essential, and that workflows are complex. It is also clear from
388 the report that authoritative data required to capture the meaning of elements within the
389 measure can be found in specific medical record locations. In conclusion it is important that HITEP
390 standardize data elements, consistently use standard code types and common code sets, and
391 enable specification of measures with respect to an EHR specific authoritative source for the
392 information desired.

393
394 The full Environmental Scan Report is attached as Appendix E.

395
396 **IV. RATIONALE**

397 Quality represents a continuum comprised of structure, process and outcome as outlined by
398 Donabedian.¹¹ For the purpose of measurement, the structure begins with evidence-based clinical
399 guidelines and algorithms; the process includes incorporation of the evidence within the care
400 model using clinical decision support (CDS) and evaluating the effectiveness and efficiency of the
401 processes and the outcomes through quality measurement. The process continues as new
402 evidence is gained through measurement to generate modifications in existing guidelines or new

¹¹ Donabedian, A. 1966. "Evaluating the Quality of Medical Care." Milbank Memorial Fund Quarterly 44 (1): 166-203.

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403 ones. The guideline, CDS and quality developers, however, arose independently so many of the
404 definitions used by each community are different. Each recognizes the value of consistent and
405 standard elements from which all groups can draw and to which all groups can contribute. This
406 HITEP effort was created to provide a framework for understanding which data are of high quality
407 and to establish a set of high quality data elements for reuse through the entire quality measure
408 supply chain.

409

410 The QDS was designed in part to address each of the HITEP-I recommendations.

411

412 *Recommendation: NQF should evaluate the quality of data types used in measure specifications as*
413 *a criterion in the endorsement of new measures, as well as in reassessment of measures for*
414 *continued endorsement.*

415 Decomposing complex quality measures into individual QDS items allows for evaluation of each
416 item separately. Therefore, the data quality of a measure can be assessed from the data quality of
417 each QDS item in that measure.

418

419 *Recommendation: A coded, interdisciplinary clinical problem list in the EHR should be used in place*
420 *of billing codes to identify patient conditions, inclusion diagnoses, and exclusion diagnoses for*
421 *quality measurement. It is further recommended that this problem list be accessible and utilized*
422 *across care settings (e.g., inpatient, outpatient, long-term care facilities).*

423 The QDS should be able to meet the immediate needs of existing measures as well as be forward-
424 reaching toward the future of measurement, including cross-cutting concepts (e.g. functional
425 status, patient preference) and transition of information sources from billing codes (ICD-9) to
426 clinical problems (SNOMED). Rather than needing to retool all existing measures separately, each
427 item in the QDS (e.g. “diabetes active diagnosis”) can be bridged individually.

428

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429 *Recommendation: NQF should work with HITSP to develop a “reader’s digest” version of a data*
430 *dictionary for use by measure developers that would contain the HITEP data types and their*
431 *corresponding HITSP-recommended code sets.*

432 In the Interoperability Specification for Quality, HITSP recommended standards for describing
433 quality information. However, current measures are written with a combination of plain English
434 and code sets, making it difficult to apply the HITSP recommendations. The QDS is a universal data
435 dictionary for quality measures. Once measures use the QDS, HITSP recommendations can be
436 applied to the QDS. This will encourage measure developers to transition information sources
437 from administrative codes to HITSP recommended codes. Implementing these recommendations
438 is more feasible with individual QDS items rather than all measures at once.

439

440 *Recommendation: Medication allergies and side effects should be distinguished from each other*
441 *and entered using standardized codes.*

442 Currently, health care software makers have difficulty translating measure descriptions from
443 paper into the computer. The QDS will standardize quality measures. This, in turn, will allow
444 software makers to more easily include quality measurement, including the differences between
445 “allergy” and “side effect” using standard HITSP-recommended codes.

446

447 *Recommendation: Standardized codes for summary impressions of diagnostic test results should*
448 *be developed, where feasible. Quantitative results, when available, should accompany qualitative*
449 *results of diagnostic studies.*

450 Quality measures are specified according to the information that is readily available. Another
451 audience of QDS is clinicians interpreting diagnostic tests. The QDS will illuminate what diagnostic
452 tests require coded summary impressions.

453

454 *Recommendation: EHR vendors should develop methods of presenting EHR medication data with*
455 *external medication data from pharmacies and pharmacy networks to help providers assess*
456 *patients’ adherence to medication treatment plans.*

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457 Quality measures using QDS can describe where the electronic information should be located. As
458 an example, medications may be found in an EHR/PHR or from a pharmacy/pharmacy network
459 directly.

460

461 *Recommendation: Quality and information technology stakeholders should work together to*
462 *define additional EHR functional requirements that support quality measurement.*

463 The QDS contains the building blocks of quality measurement, serving as a single converging
464 dictionary for both quality measure developers and information technology programmers. Initial
465 quality functions required by an EHR can begin with the QDS, allowing for innovation by all
466 stakeholders around a common standard.

467

468 **V. GOALS**

469 The goals of the QDS address HITEP-I recommendations and encourage automating quality
470 measurement using electronic clinical information.

471

472 *Goal: Describe, unambiguously, the clinical information needed for all quality measures.*

473 Quality measures define similar clinical concepts in different ways challenging the comparability of
474 similar measure conditions from different measure developers. Furthermore, measure definitions
475 can be ambiguous, often a reflection of missing or inadequate clinical information at the source.

476 As we move toward electronic clinical information, we have the opportunity to more precisely
477 define clinical information needed for quality measurement.

478

479 *Goal: Reuse quality information definitions.*

480 A sustainable quality measurement system must balance the need for a variety of definitions
481 without the burden of programming each new variation. A coordinated approach of first defining
482 existing quality information followed by their harmonization will result in the reuse of each
483 definition. Reuse minimizes rework and allows quality measurements to mature while limiting the
484 burden of re-programming each new definition.

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485

486 *Goal: Accommodate current and future measure needs.*

487 The future of quality measurement will be powered by electronic clinical information, allowing
488 real-time feedback to clinicians. As we transition clinically from paper to electronic records,
489 quality measurement must work with the administrative/claims data currently available, albeit
490 imperfect. The QDS will serve as the guide to transition clinical information to electronic sources.

491

492 *Goal: Bridge the translation gap between quality measure content experts and health record*
493 *programmers.*

494 Although the underlying clinical information is similar between these stakeholders, the method
495 for describing the same information differs. A common language that both quality measures
496 developers and health IT programmers can speak will facilitate automated measurement using
497 electronic information. This common language must be intuitive to the content of measure
498 developers and relate to the technical requirements of health IT programmers. The QDS is the
499 Rosetta Stone that will translate between the quality and health IT domains.

500

501

502 **VI. WORKGROUPS**

503

504 Quality measurement information can be divided into a) definitions for clinical information and b)
505 instructions for locating the information. As both of these are required to automate quality
506 measurement, HITEP created two workgroups, QDS and dataflow, respectively.

507

508 *QDS Workgroup*

509 The goal of the QDS workgroup was to provide a centralized, maintained repository of quality data
510 requirements (concepts, datatypes, data elements, code sets) and data definitions used by
511 multiple stakeholders to develop, specify, and enable quality measurement. The scope included:

- 512
- Begin with existing measure data specifications from current measure developers.

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- 513 • Evaluate the CMS CARE tool, The Joint Commission transfers of care data sets.
514 • Include cross-cutting, longitudinal quality concepts such as patient preference and functional
515 status that require data from disparate information systems.
516 • Structure the QDS to include future measure data requirements using EHR data across care set
517 tings.
518 • Propose a framework that can represent current and future measures.

519

520 *Dataflow Workgroup*

521 The goal of the dataflow workgroup was to identify the most authoritative source for specific
522 quality information required by any measure. The meaning of this quality information may vary
523 depending on its source, how it is acquired, how it is recorded, in which setting it occurred, and in
524 which health record field it is stored. Ideally, guideline, CDS, or quality measure developers
525 should define these attributes to accurately capture the measure’s intent. The scope of the
526 dataflow workgroup included:

- 527 • Establish the framework of essential data element attributes to describe the authoritative
528 source of quality information.
529 • Evaluate the set of quality data elements and create a set of options for these attributes.

530

531 The QDS and dataflow workgroups worked independently, and then joined forces to consolidate
532 their efforts for evaluation by the full HITEP panel.

533

534

535 **VII. EXPERT PANEL ANALYSIS**

536 The Health Information Technology Expert Panel (Appendix A) initially convened in Washington,
537 DC, February 24, 2009. The QDS and Dataflow workgroups convened twice, February 25 and April
538 13, 2009. Co-chairs from the workgroups presented recommendations to the second meeting of
539 HITEP, May 6-7, 2009.

540

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541 **Framework Process**

542 The HITEP QDS Workgroup (Appendix B) and HITEP Dataflow Workgroup (Appendix C) met on
543 February 25, 2009 beginning with a starter set of ten selected measures that covered inpatient
544 and ambulatory settings, as well as some newer clinically enriched measures to address clinical
545 elements available electronically in the near term. For each measure, the workgroups identified
546 the types of information required to calculate the measure and the location of that information,
547 respectively. These types, or quality datatypes, are a continuation from the work of HITEP-I. The
548 QDS Workgroup identified quality datatypes required for the current measures and for future
549 measures addressing continuum of care and the NPP National Priorities. Additionally, the QDS
550 workgroup created a framework, or model, to include both quality datatypes and standard code
551 lists specified in measures. The Dataflow workgroup created a framework to describe the
552 origination and location of the information. Through a series of workgroup calls, the QDS
553 workgroup reviewed additional NQF-endorsed measures using a web-based evaluation system.
554 The frameworks were modified to better fit the structure of quality measures. The QDS
555 framework, quality datatypes, dataflow framework and dataflow descriptions were finalized at
556 the second meeting on April 13, 2009 and presented to the full HITEP Panel on May 6 and 7, 2009.
557 Quality datatypes were further validated by applying the QDS framework to all 511 NQF-endorsed
558 measures. The purpose of the QDS and dataflow are to describe the information required to
559 calculate quality measures. While other efforts have focused on how to describe a measure
560 algorithm or logic (e.g. *If A and not B then C or D*), the QDS will provide the basic building blocks –
561 the clinical information – needed to complete the algorithm.

562

563 **Example Measure 1: Diabetic Control of Hemoglobin A1c**

564

565 To illustrate the QDS framework, we will follow an example, simplified measure through this
566 report. The measure is intended to show the effectiveness of care for patients with diabetes. The
567 basic determinant of the denominator (or population) is patients with an *active diagnosis of*
568 *diabetes*. The quality data element, therefore, is *active diagnosis of diabetes*. This element can

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569 be reused by other measures to define a specific population of patients with diabetes. In the
570 example, the active diagnosis is listed as *an administrative claim of diabetes*. The application of
571 the QDS and dataflow frameworks will detail preferred methods and code sets to identify an
572 active diagnosis (or problem) to avoid the need for administrative claims and use of clinical
573 information from the EHR.
574

Percentage of patients with diabetes (either by
administrative claim of diabetes or if a *diabetic*
medication has been dispensed) who have had a *Hemoglobin*
A1c laboratory test result < 8% within the past year.

[National Committee for Quality Assurance (NCQA),
currently under review for endorsement]

Figure 1. Example Measure Description. The measure is intended to show
the effectiveness of care for patients with diabetes.

575
576 The above example requires the following pieces of information:
577
578 1. active diagnosis of diabetes
579 2. diabetic medication dispensed
580 3. hemoglobin A1c laboratory test result (including the date of the result to calculate if it was
581 performed within the last year)

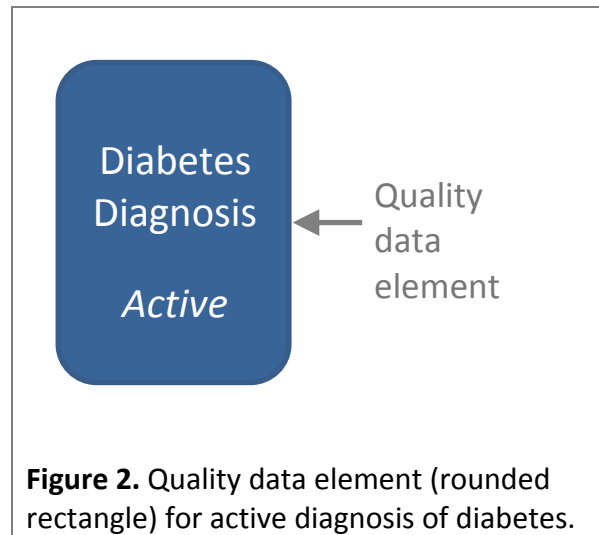
582
583 The QDS framework describes these types of information, generalized for any measure. The
584 dataflow framework shows how to locate this information electronically.

585
586 **Quality data element**

587 A quality data element is a single piece of information used in quality measures to describe part of
588 the clinical care process including both a clinical entity and its context of use. In our example, the
589 basic determinant of the denominator, or patient population, is patients with an *active diabetes*
590 *diagnosis* (Figure 2).

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591



592

593 The quality data element contains both a clinical entity (diabetes diagnosis) and how it is used
594 (active). This element may be defined in one measure and reused in additional measures to define
595 a specific population of diabetic patients. This reuse encourages standardization of quality
596 measures and it reduces computer programming requirements for new measures.

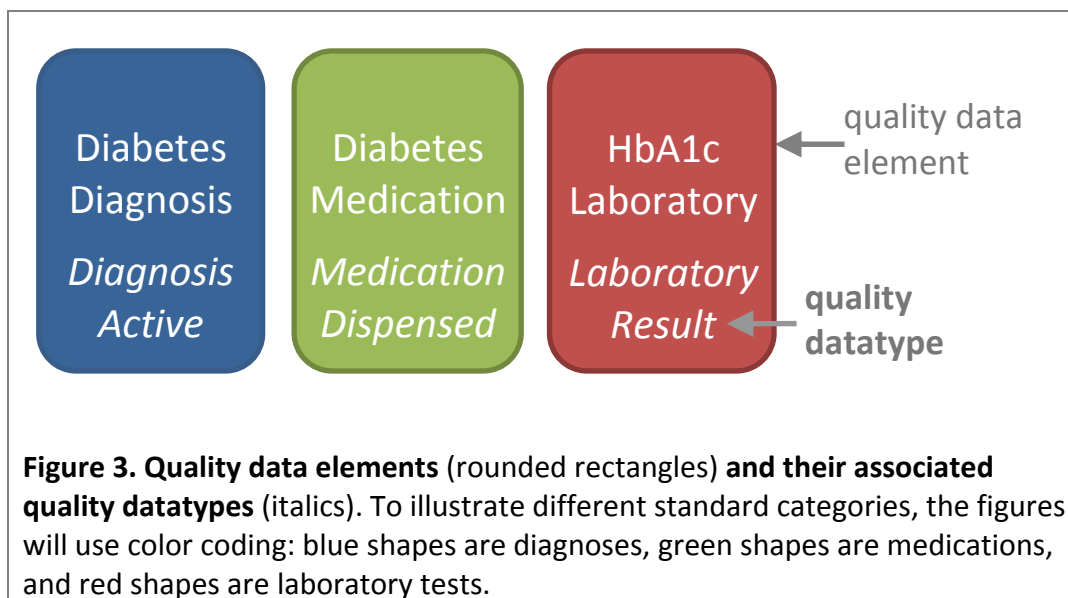
597

598 **Quality Datatype**

599 Current measure specifications assist abstractors with understanding the quality data element
600 component parts so they can be found within a medical record. Similarly, a computer system
601 needs to understand the component parts to correctly find the appropriate information. In this
602 example, an active diagnosis is a *type* of information representing a condition that is currently
603 monitored, tracked, or that needs to be factored into the current treatment plan. HITEP called a
604 *type* of information a *quality datatype*. Other related quality datatypes are a *past history*
605 *diagnosis*, or a *family history diagnosis*. These are all uses of the standard category *diagnosis*. The
606 quality datatype more clearly identifies the meaning intended in the measure to appropriately
607 locate the intended electronic information. Each quality datatype applies a specific use to a data
608 category (Figure 3).

609

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610

611 Only three datatypes are required for this measure. The full list of quality datatypes for all
612 measures are discussed below in the section “QDS Datatypes.”

613

614 **Quality Datatype-specific Attributes**

615 Quality elements should all contain a date/time stamp. Additionally, certain quality datatypes
616 contain qualifying information or attributes. For example, *medication dispensed* and *medication*
617 *ordered* both contain information about *dose*, *route*, *strength*, and *duration*. However, *medication*
618 *allergy*, although it may be referring to same medication above would contain information about
619 the *allergy type*, *allergy severity*, etc. As these qualifiers pertain to specific quality datatypes, they
620 are called *quality datatype-specific attributes*.

621

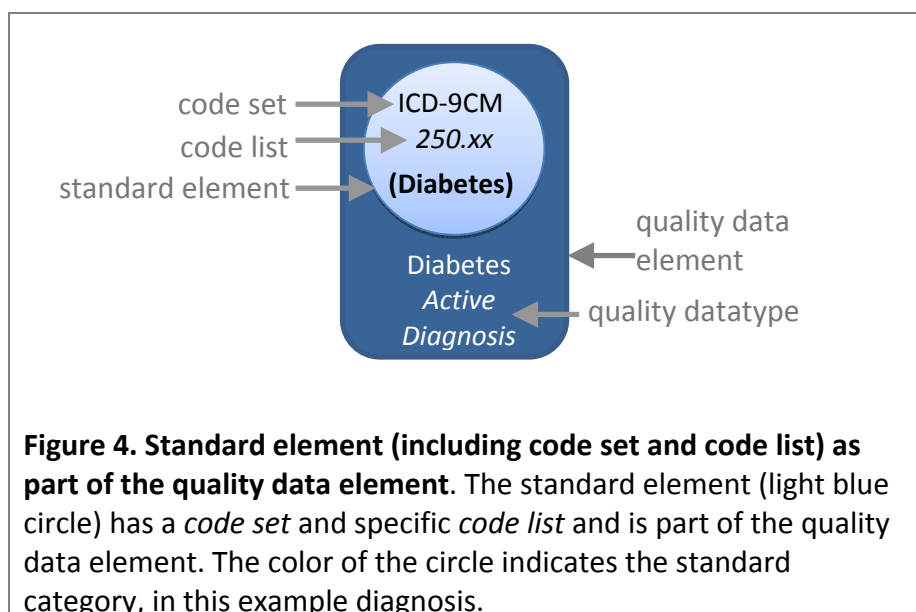
622 **Standard element**

623 To automatically locate quality data elements within an electronic medical record, information
624 must be described explicitly. While “diabetes” may be easily understood by people, computers
625 have difficulty understanding English. Therefore, computer *code sets* (or coding systems) are used
626 to define the clinical information or *standard category*. In the example measure, the standard
627 category *diagnosis* can be defined using the ICD-9 CM code set. Furthermore, measure

25

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628 developers choose a specific *code list* to define *diabetes*. These codes are stored in a reusable
629 format called a *standard element*, which contains a name, a code set, and a code list, for example
630 diabetes, ICD-9 CM, 250.xx (Figure 4). To provide a greater clinical context for measurement, for
631 the future, the code set for problems should reference SNOMED-CT as noted in the HITEP I report.
632

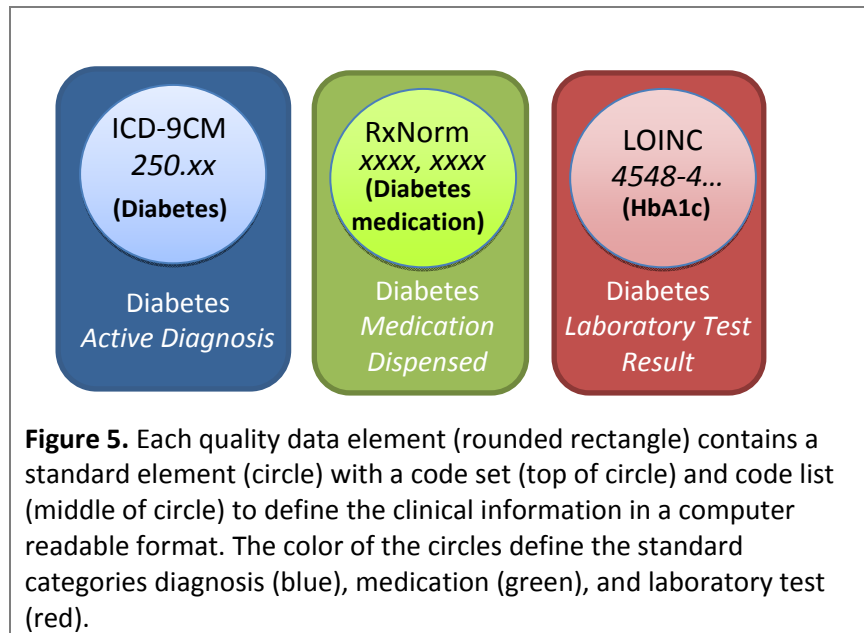


633
634 Different quality data elements will reuse the same *code list*. For example, the quality data
635 element *diabetes family history* may search for the same diabetes codes as the *diabetes active*
636 *diagnosis*. HITEP defined this *standard element* as a unique concept that can be represented by a
637 numerical value (e.g., a birthdate), or a specified list of codes that can be interpreted in an
638 electronic system.¹² Figure 5 demonstrates standard elements for our example measure.

¹² The EHR Functional Model Glossary (2009) defines a code set as 'Under HIPAA, this is any set of codes used to encode data elements, such as tables of terms, medical concepts, medical diagnostic codes, or medical procedure codes. This includes both the codes and their descriptions. HIPAA requires every provider who does business electronically to use the same health care transactions, code sets, and identifiers. Code sets are the codes used to identify specific diagnosis and clinical procedures on claims and encounter forms.' The glossary provides the following references: <http://aspe.hhs.gov/admsimp/faqcode.htm>, and www.cms.hhs.gov/TransactionCodeSetsStands/.

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639



640

641

642 Standard elements may contain a list of codes (e.g., ICD-9-CM diagnosis codes), words (e.g., drug
643 names), or concepts described at length in measure specifications (e.g., definition of smoking
644 cessation counseling components) to allow an abstractor to determine if the concept is in the
645 medical record. For the exchanged of clinical information among electronic data systems, HITSP
646 has recommended specific code sets for each standard category including problems (SNOMED-
647 CT¹³), medications (RxNorm¹⁴ and NDF-RT¹⁵), laboratory procedures (LOINC^{®16}), and others¹⁷.

¹³ [SNOMED CT](http://www.nlm.nih.gov/research/umls/Snomed/snomed_main.html) (Systematized Nomenclature of Medicine--Clinical Terms) is a comprehensive clinical terminology, originally created by the [College of American Pathologists](#) (CAP) and, as of April 2007, owned, maintained, and distributed by the [International Health Terminology Standards Development Organisation](#) (IHTSDO), a non-for-profit association in Denmark. More information is available at: http://www.nlm.nih.gov/research/umls/Snomed/snomed_main.html

¹⁴ RxNorm provides normalized names for clinical drugs and links its names to many of the drug vocabularies commonly used in pharmacy management and drug interaction software, including those of First Databank, Micromedex, MediSpan, Gold Standard Alchemy, and Multum. By providing links between these vocabularies, RxNorm can mediate messages between systems not using the same software and vocabulary. More information is available at: <http://www.nlm.nih.gov/research/umls/rxnorm/>

¹⁵ The National Drug File – Reference Terminology (NDF-RT) is produced by the U.S. Department of Veterans Affairs, Veterans Health Administration (VHA). NDF-RT is an extension of the VHA National Drug File (NDF). It organizes the drug list into a formal representation. NDF-RT is used for modeling drug characteristics including ingredients, chemical structure, dose form, physiologic effect, mechanism of action, pharmacokinetics, and related diseases. More information is available at: <http://www.nlm.nih.gov/research/umls/sourcereleasedocs/2008AB/NDFRT/>.

¹⁶ LOINC[®] (Logical Observation Identifiers Names and Codes) - The purpose of LOINC[®] is to facilitate the exchange and pooling of clinical results for clinical care, outcomes management, and research by providing a set of universal codes and names to identify

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648
649 The advantage of using standard elements is that a single code list can be reused in many
650 different quality data elements. For example, the standard element in Figure 3, “diabetes
651 medications,” contains approximately 100 different medication codes. Rather than having to
652 redefine that list of codes each time it is referenced in a new measure, the measure can simply
653 refer to the standard element “diabetes medications.” This is akin to referencing a “look-up”
654 spreadsheet or appendix, as is the current practice in many measures involving medication lists.
655 Once defined, this standard element can then be reused in many different clinical contexts as a
656 component of multiple quality data elements. Referring back to our sample measure that needs to
657 know if diabetes medications were dispensed; the standard element is “diabetes medications,”
658 the quality datatype is “medication dispensed,” and the quality data element is “diabetes
659 medication dispensed.” Another measure may reuse the same standard element “diabetes
660 medications” in the context of “was it ordered?” The standard element remains “diabetes
661 medications,” however the quality datatype would be “medication ordered,” and the resulting
662 quality data element would be “diabetes medication ordered.” Yet a third measure may reuse
663 “diabetes medications” to exclude a patient from receiving the medication due to an allergy; the
664 standard element remains “diabetes medications,” the quality datatype would be “medication
665 allergy,” and the quality data element becomes “diabetes medication allergy.”

666

667 **Quality Dataflow**

668 In the examples above, the computer would know the code list (defined by the standard element)
669 and how it is used (defined by the quality element). However, in order to identify the
670 authoritative source and the appropriate meaning for such information within an individual
671 patient’s record the electronic record would need to know additional related information, such as

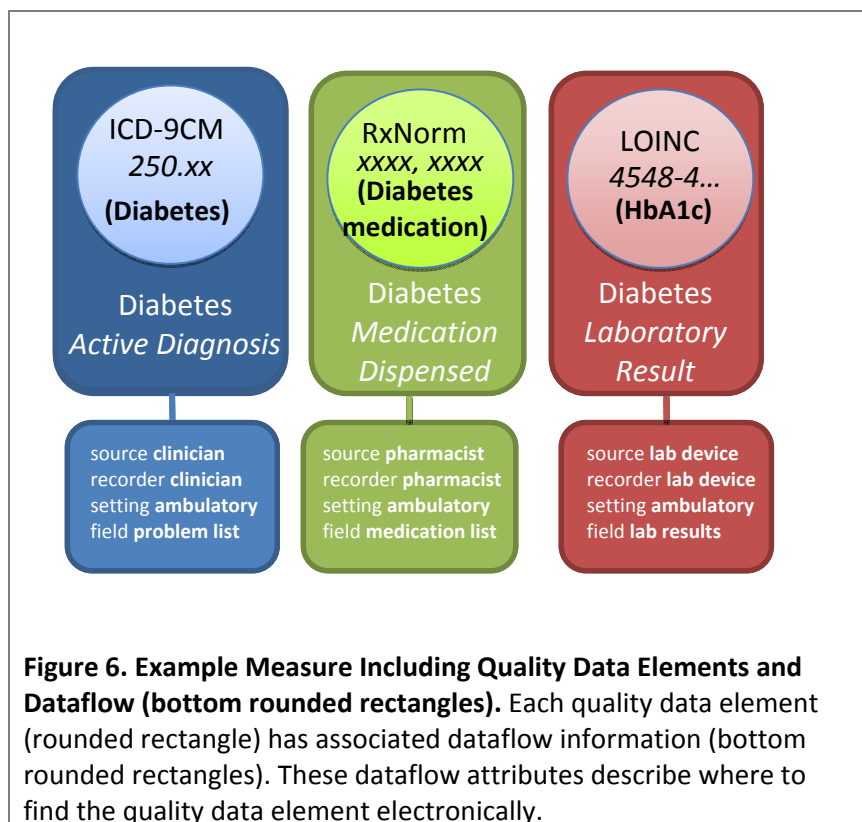
laboratory and other clinical observations. The [Regenstrief Institute, Inc.](http://www.regenstrief.org/), an internationally renowned healthcare and informatics research organization, maintains the LOINC database and supporting documentation, and the RELMA mapping program. More information is available at: <http://loinc.org/>.

¹⁷ The HITSP Clinical Document and Message Terminology Component defines the vocabularies and terminologies utilized by HITSP specifications for Clinical Documents and Messages used to support the interoperable transmission of information. More information is available at: http://hitsp.org/ConstructSet_Details.aspx?&PrefixAlpha=4&PrefixNumeric=80.

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672 where to find information of that type and in that clinical context. For example, “diabetes
673 medications” *order* may be found in the medication orders, whereas “diabetes medications”
674 *allergy* will be on the allergy list. Similarly, a clinician’s account of an allergy may be found in an
675 EHR allergy list, but a patient’s account of an allergy will be found in a PHR allergy list. Quality
676 Dataflow allows a measure developer to clearly define in the specifications where the quality data
677 should be found to achieve the intended meaning of the measure (Figure 6).

678



679

680 The dataflow contains four attributes:

681

- 682 1. **Source:** The source is the originator of the quality data element. The source may be an
683 individual or a device. Some examples:
 - 684 a. In the case of a laboratory result, the source may be the laboratory measurement
685 device.

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- 686 b. To know that a medication is taken by the patient at home, the source may be the
687 patient or patient proxy.
- 688 c. The source of a left ventricular ejection fraction is an imaging device such as cardiac
689 ultrasound.
- 690 2. **Recorder:** The recorder is the individual or device that enters the data element into a
691 health record field. The desired recorder may be the same as the source of the data, but
692 that is not necessarily true.
- 693 3. **Setting:** The setting is the physical location at which the data element is captured. The
694 setting defines the encounter location during which the data are expected to originate.
- 695 4. **Health Record Field:** The health record field is the location within an electronic record
696 where the data should be found. As shown in the examples, a problem list may be the
697 preferred and only acceptable field in which an active diagnosis of diabetes may be found.
698 A family history may be the preferred health record field for family history of diabetes.

699

700 While a quality data element can be shared by many measures, the dataflow attributes should be
701 defined *within* a given measure specification and should be specific to that measure. Enabling
702 definition of dataflow as part of the measure authoring environment enables a measure
703 developer to simplify the measure specification descriptions and very clearly state the acceptable
704 health record field(s). Specifying the authoritative source of information allows a measure
705 developer to determine how, by whom, and where, within the clinical workflow, a process was
706 occurred or an outcome achieved. To illustrate how the same quality data element can be used in
707 measures, suppose two measures wish to measure blood pressure management:

- 708
- 709 1. Blood pressure compliance in the ambulatory setting, and
 - 710 2. Blood pressure measurement at home.

711

712 Both will utilize the same quality data element of “blood pressure physical finding,” however, the
713 dataflow attributes can describe different authoritative sources for the same type of information:

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714 vital signs taken by a nurse (or physician) in an office practice and recorded in an EHR vital sign
715 field, and vital signs taken by a patient or patient proxy in the home setting and recorded in a PHR
716 vital sign field, respectively (Figure 7).

717

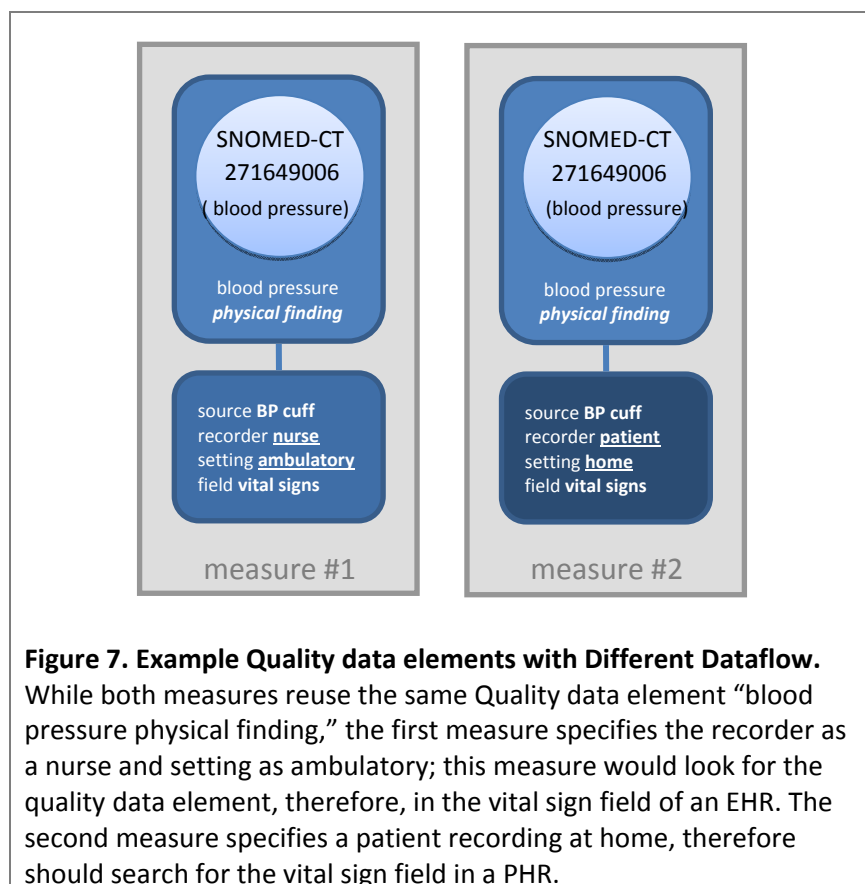


Figure 7. Example Quality data elements with Different Dataflow.

While both measures reuse the same Quality data element “blood pressure physical finding,” the first measure specifies the recorder as a nurse and setting as ambulatory; this measure would look for the quality data element, therefore, in the vital sign field of an EHR. The second measure specifies a patient recording at home, therefore should search for the vital sign field in a PHR.

718

719 **Summary of QDS Framework**

720 The QDS framework contains three levels of information: *standard elements, quality data*
721 *elements, and dataflow attributes* (Figure 8).

722

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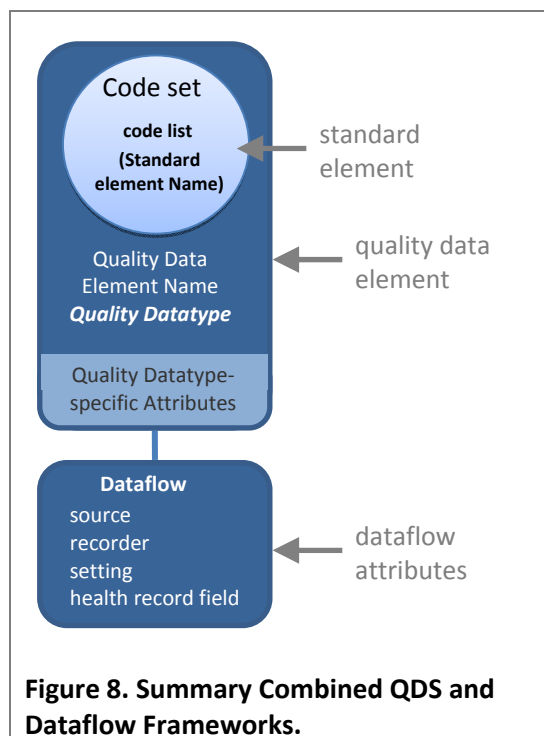


Figure 8. Summary Combined QDS and Dataflow Frameworks.

723

724

Standard element – an atomic unit of data that is identified by a data element name, a code type, and a code set comprised of one or more enumerated values. Examples include diabetes and all pertinent ICD-9CM codes, or diabetes medications and all representative medications coded in the code type RxNorm. Standard data elements can be reused within other quality data elements.

728

Standard category – A standard category is a class or category of information. Examples include medication, problem, laboratory test, diagnostic test, etc. Many datatype categories contain qualifying information or attributes. As an example, *medication* has specific attributes of *dose*, *route*, *strength*, and *duration*. *Allergy*, whether referring to medication, environmental, chemical or other types of information has specific attributes including *allergy type*, *allergy severity*, etc.

734

735

Quality data element – A single piece of information used in quality measures to describe part of the clinical care process. It can be considered the specific instance of use. The quality data element represents the standard data element with its perspective of use. Examples include

737

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738 active diabetes diagnosis, diabetes family history, diabetes medication dispensed. Quality data
739 elements can be reused by other measures, clinical guideline and CDS developers.

740 *Quality datatype* – A quality datatype is a grouping of information that indicates the
741 circumstance of use for any individual standard datatype. Examples include active
742 diagnosis, family history of diagnosis, medication prescribed. All quality datatypes should
743 all contain a date/time stamp. The quality datatypes inherit the attributes of the datatype
744 categories from which they are developed. Hence, medication administered maintains the
745 medication datatype attributes of *dose, route, strength, and duration*. Medication allergy
746 inherits allergy datatype attributes of *allergy type, allergy severity, etc.*

747
748 *Dataflow attributes* – Dataflow attributes describe the authoritative source for the information
749 required to represent the quality data element. The authoritative source, as shown in the
750 examples will vary with the intended meaning of the performance measure. In the example
751 shown in Figure 5, one measure shows monitoring and compliance with the treatment plan based
752 on the clinician as the authoritative source. The second measure in that example shows patient
753 engagement in patient care by specifying the patient and a patient generated finding as the
754 authoritative source. The measure specification, therefore assigns the dataflow attributes to the
755 QDS elements used within the measure.

756

757 In summary, the four dataflow attributes are repeated here:

758

759 **Source:** The source is the originator of the quality data element. The source may be an
760 individual or a device. Some examples:

761 In the case of a laboratory result, the source may be the laboratory measurement
762 device.

763 To know that a medication is taken by the patient at home, the source may be the
764 patient or patient proxy.

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765 The source of a left ventricular ejection fraction is an imaging device such as cardiac
766 ultrasound.

767 **Recorder:** The recorder is the individual or device that enters the data element into a health
768 record field. The desired recorder may be the same as the source of the data, but that is not
769 necessarily true.

770 **Setting:** The setting is the physical location at which the data element is captured. The setting
771 defines the encounter location during which the data are expected to originate.

772 **Health Record Field:** The health record field is the location within an electronic record where
773 the data should be found. As shown in the examples, a problem list may be the preferred and
774 only acceptable field in which an active diagnosis of diabetes may be found. A family history
775 may be the preferred health record field for family history of diabetes.

776

777 It is also the measure specification that uses the QDS to describe the algorithms or logic of a
778 measure. The QDS describes the basic information needed to calculate a measure. These quality
779 data elements come together, along with logic, in the details of a measure specification.

780

781 **Measure Logic**

782 Industry efforts, namely the AMA/NCQA/EHR Collaborative Health Quality Measure Format
783 (HQMF)¹⁸, have focused on describing the algorithms and logic of measures and created
784 prototype representations for measures. To clearly differentiate the QDS, combination statements
785 and specific values are best managed during the measure authoring environment, adding logic to
786 the quality data element itself. Below are examples of concepts that may be represented in the
787 measure authoring environment and the specific quality data elements used to represent them.

788

¹⁸ The Health Quality Measures Format is the product of The Collaborative for Performance Measure Integration with EHR Systems. The Collaborative for Performance Measure Integration with EHR Systems (“Collaborative”), co-sponsored by the American Medical Association (AMA) and the National Committee for Quality Assurance (NCQA) and Electronic Health Record Association (EHRA) is a group of stakeholders in the physician performance measurement and quality improvement arena who have a shared goal to provide the industry with workable recommendations for performance measure use.
<http://code.google.com/p/hqmf/>

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measure concept	required Quality data elements	Rationale
“ACEI or ARB prescribed”	ACEI medication prescribed, ARB medication prescribed	ACEI and ARB are joined together in the measure logic with <i>or</i> . This allows reuse of two existing quality data elements.
“HbA1c > 9%”	HbA1c laboratory test result	If measures have different thresholds for HbA1c, the QDS should contain the element that represents the result, and allow the measure to calculate the logic of the actual value(s), e.g., > or < a threshold. This method allows other measures to reuse the same QDS concept and, as new evidence is gained, modify the expected thresholds without changing the quality data element needed to represent the information in the health record.
“ambulates 10 meters”	ambulation distance functional status	Similar to HbA1c, the threshold “10 meters” is best defined in the individual measure.
“improved gas exchange”	oxygen saturation	The measure can calculate the logic of “improvement” from two gas exchange quantitative results during a specified window of time
“patient age”	birth date patient characteristic, measurement calculation date system characteristic	Patient age is calculated by <i>measurement calculation date – date of birth</i>
“worsening renal failure”	serum creatinine laboratory test results	Worsening renal failure is calculated in the measure logic by a rate of change of creatinine value over time exceeding a threshold set by the measure.

789

790

791 **QDS Datatypes**

792 A list of QDS datatypes are listed in the table below. Full definitions are listed in a glossary,

793 Appendix D.

794

Standard Categories	QDS Datatypes
Care goal	care goal care plan
Communication	communication to communication from
Diagnosis / Condition / Problem	diagnosis active diagnosis family history diagnosis past history

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Standard Categories	QDS Datatypes
	diagnosis, risk of
Device	device applied device ordered device offered device refused
Diagnostic study	diagnostic study order diagnostic study result diagnostic study offered diagnostic study refused
Encounter	encounter
Functional status	functional status
Individual characteristic	patient characteristic provider characteristic
Intervention (non-procedure)	intervention administered intervention completed intervention discontinued intervention offered intervention refused
Laboratory test	laboratory test performed laboratory test order laboratory test result laboratory test offered laboratory test refused
Location	location
Medication	medication administered medication adverse event medication allergy medication discontinued medication dispensed medication intolerance medication order medication offered medication refused
Physical finding	physical exam finding
Preference	patient preference provider preference
Procedure	procedure history procedure order procedure result procedure assessment-of procedure offered procedure refused
Risk category / assessment	risk category / assessment
Satisfaction	satisfaction

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Standard Categories	QDS Datatypes
Screening	screening result
Survey	survey result
Symptom	symptom active symptom assessed
System characteristic	system characteristic

795

796

797 **Quality Dataflow Attributes and Associated Choices**

798 Dataflow attributes and associated choices are listed in the tables below for (a) sources, (b)
799 recorder, (c) setting, and (d) health record field. These dataflow choices were developed from a
800 set of existing measures and expectations for future measures, the list of options will expand as
801 new authoritative sources are identified.

802

Dataflow: Sources	
Any Clinician*	Occupational Therapist
Care Manager*	Other Clinician*
Clinical Trial Coordinator*	Other Healthcare Team Member*
CPOE	Patient*
CRNA*	Patient Proxy*
Electronic Monitoring Device	Pharmacist*
EMS Staff*	Pharmacy Management System (PhMS)*
Enterostomal Therapist	Physical Therapist*
ePrescribing	Physician*
Family Member*	Radiologist*
Laboratorian / Lab Tech*	Ultrasonographer*
Laboratory Information System	Radiology Information System
Laboratory Modality	Registration Clerk*
Manually Operated Device	Specialty Driven Therapist
Midlevel Practitioner*	Speech/Language Pathology Therapist
Modality device (digital Xray, U/S)*	Triage Nurse*
Monitoring Device*	
Nurse*	
Nurse Practitioner (APRN)*	
<i>black print = person, blue print = device/machine, * = also listed as a Source</i>	

803

804

Dataflow: Recorders

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Dataflow: Recorders	
Any Clinician*	Occupational Therapist
Care Manager*	Other Clinician*
Clinical Trial Coordinator*	Pharmacy Benefit Manager
CRNA*	Pharmacy Management System (PhMS)*
Dentist	Physical Therapist*
Dietician	Physician*
Electronic Monitoring Device	Physician Assistant
EMS Staff*	Protocol
Family Member*	Provider
Laboratorian / Lab Tech*	Radiologist*
Midlevel Practitioner*	Ultrasonographer*
Modality device (digital Xray, U/S)*	Radiology Technician
Monitoring Device*	Registration Clerk*
Nurse*	Researcher
Nurse Practitioner (APRN)*	Respiratory Therapist
OR Clerk	RxHub/Surescripts
Other Clinician*	Student
Other Healthcare Team Member*	Technician
Patient*	Triage Nurse*
Patient Proxy*	Unit Clerk
Payer	
Pharmacist*	

*black print = person, blue print = device/machine, * = also listed as a Source*

805

806

Dataflow: Settings	
Acute Care Facility	Extended Care Facility
Ambulatory	Home
Ambulatory Community Based	Home Care
Ambulatory Hospital Based	Home Hospice
Ambulatory Surgicenter	Hospice / Palliative Care
Emergency Department	Hospital
EMS entity	Inpatient

807

808

Dataflow: Health Record Fields*	
Administering Agent / Vendor	Medical Device
ADT	Medication Administration Record
Advanced Directives	Modality (e.g., PACS System)
Allergy List	Monitoring Device
Allergy Repository	Master Patient Index

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Dataflow: Health Record Fields*	
Allergy Service	Narrative Text Note
Ambulatory e-Pharmacy Management System	Nursing Documentation
Anesthesia Record	Nursing Note
Autopsy Record	Nursing Plan of Care Intervention
Continuity of Care Record	Nursing Plan of Care Outcome
Clinical Documentation	Nursing Task List
Clinical Note	Operating Room Management System
Consult Summary Document	Operative Report
Discharge Summary	Patient Request
Diagnosis Field / Claims File	Pharmacy Information Management System
Electronic Record Exam Section	Pharmacy Management System (PhMS)
Electronic Record Vital Signs / Examination Section	Plan of Care
Emergency Department Clinical Note	Problem List
Emergency Department Evaluation Summary	Protocol
Emergency Management System Form	Radiology Information System
ePrescribing	Registry
Emergency Department Notes, Narrative text or encoded	Social History
Imaging Modality (e.g., Ultrasound)	Survey Instrument
Immunization Record	Transition Record
	Triage From
	Vital Signs

** from containers such as EHR, PHR, HIE, etc.*

809

810

811 **VIII. EXAMPLE MEASURES**

812

813 Following is an example of two future EHR derived measures that would use the QDS and
 814 dataflow elements. Two current measures, one intended for the ambulatory setting and one for
 815 the inpatient setting were selected and retooling options are discussed to demonstrate the
 816 selection of QDS and dataflow elements can modify the process. The first is ambulatory based
 817 seeking the percentage of patients with coronary artery disease who were prescribed antiplatelet
 818 therapy. The second measure example seeks the percentage of patients admitted to a hospital
 819 who receive prophylaxis for venous thromboembolism or documentation why such prophylaxis
 820 was not given.

821

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822 **Example Measure 1: Antiplatelet therapy for Coronary Artery Disease (ambulatory)**

823
 824 This measure identifies the percentage of patients with CAD who were prescribed antiplatelet
 825 therapy¹⁹.

826

Percent of patients with coronary artery disease (CAD) who were prescribed antiplatelet therapy.		
Denominator	Numerator	Exclusion
All patients with CAD and >18 years and encounters with the physician - ICD-9-CM codes for CAD OR - CPT Diagnosis codes related to CAD AND - CPT codes for patient visit - Patient's age is > 18 years	Patients prescribed antiplatelet therapy (aspirin, clopidogrel or combination of aspirin and dipyrimadole) - Drug list, OR - CPT-II code: 4011F Oral antiplatelet therapy prescribed	Documentation of medical reason(s) for not prescribing antiplatelet therapy: - Active bleeding in the previous six months, which required hospitalization(s) or transfusion(s); OR - Aspirin/clopidogrel allergy/intolerance (ICD-9-CM exclusion codes), OR - Other medical reason(s) documented by the practitioner for not prescribing antiplatelet therapy - CPT-II codes • Modifier: 4011F 1P [Documentation of patient reason(s) (e.g., economic, social, religious)]. OR • Modifier: 4011F 2P [Documentation of system reason(s) documented by the practitioner for not prescribing antiplatelet therapy] • Modifier 4011F 3P
<i>Per Patient:</i> Whether or not patient was prescribed antiplatelet therapy <i>Per Patient Population:</i> Percentage of all patients who were prescribed antiplatelet therapy Percentage of patients who were prescribed antiplatelet therapy, with all denominator exclusions applied		

827
 828 The measure provides access to a set of drug names that represent antiplatelet therapy, including
 829 aspirin, clopidogrel, and combinations of aspirin and dipyrimadole. If codes for each of the
 830 acceptable medications is provided, an EHR or an eprescribing electronic data stream can identify
 831 that a prescription was created for any one of them. However, medications taken over the
 832 counter and not part of a prescription, e.g., aspirin 81 mg requires specific documentation the

¹⁹ American College of Cardiology, American Heart Association, and Physician Consortium for Performance Improvement **Clinical Performance Measures: Chronic Stable Coronary Artery Disease**, Tools Developed by Physicians for Physicians. 2005. Available at: <http://www.ama-assn.org/ama1/pub/upload/mm/370/cadminisetjune06.pdf>.

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833 patient was informed to purchase and take the over the counter medication. Aspirin, therefore,
834 will not be in a transaction stream but it should be on the active medication list.

835

836 **Example Measure 1: QDS**

837 Review of this measure for the Quality Data Set (QDS) identified the following quality data
838 elements. Today, this measure relies on existing coding systems (e.g., ICD-9 CM, CPT, CPT-II). It is
839 expected that EHRs will capture all of this information electronically as a byproduct of direct
840 clinical care and transactions. Appropriate coding systems for defining each element will be
841 different in the future. As clinical data are available for measurement the requirement for
842 attestation for inclusion or exclusion quality data elements will be drastically reduced.

- 843 • active diagnosis of coronary artery disease
- 844 • birthdate
- 845 • patient visit
- 846 • aspirin therapy prescribed
- 847 • clopidogrel therapy prescribed
- 848 • dipyrimadole therapy prescribed
- 849 • past history active bleeding
- 850 • aspirin allergy
- 851 • clopidogrel allergy
- 852 • dipyrimadole allergy
- 853 • medical reasons for exclusion
- 854 • patient reasons for exclusion
- 855 • system reasons for exclusion

856

857 **Example Measure 1: Dataflow**

858 Even though today the measure uses CPT-II codes to represent physician attestation that
859 antiplatelet therapy has been prescribed, entry of aspirin as an n active medication on the
860 medication list will ensure the medication list is more accurate and focused on all medications and

41

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861 over-the-counter agents and it will also enable more effective medication interaction checking.
 862 The Data Flow category framework established by the HITEP allows a measure developer to select
 863 detailed elements, following the data workflow, that represent the preferred meaning. In this
 864 example, rather than physician attestation that antiplatelet therapy has been prescribed (CPT-II
 865 code: 4011F Oral antiplatelet therapy prescribed), a re-tooled measure may require that the
 866 medication ‘health record field’ is the medication list. Similarly, medication reconciliation may be
 867 performed by a clinician other than a physician such that the data source remains the patient or
 868 patient proxy (perhaps via direct communication with a clinician or electronically through a
 869 personal health record patient generated active medication list). These elements are described
 870 more clearly in the table below. Note that some elements, depending on local workflow, may be
 871 entered by clinicians other than physicians, addressing data flow will help reduce the burden for
 872 any one individual at all locations to document specified information.

873

Quality data element	Source	Recorder	Setting	Health Record Field
Coronary artery disease diagnosis active	Physician	Physician	Ambulatory	Problem List
Birthdate	Patient OR Patient Proxy	Patient, Patient Proxy, Clinician	Ambulatory	Demographics
Patient ambulatory encounter (1 st encounter diagnosis, # of encounters with same diagnosis)	Physician	Physician	Ambulatory	Billing
Patient ambulatory encounter level of service	Physician	Physician	Ambulatory	Billing
Aspirin order	Physician	Physician	Ambulatory	Medication list (active)
Clopidogrel order	Physician	Physician	Ambulatory	Medication Dispensed*
Dipyrimadole order	Physician	Physician	Ambulatory	Medication Dispensed*

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Quality data element	Source	Recorder	Setting	Health Record Field
Past History active bleeding	Physician, Patient, Patient Proxy	Clinician	Ambulatory	Problem List
Aspirin allergy	Patient, Patient Proxy, Clinician	Clinician, Patient, Patient Proxy	Ambulatory	Allergy List
Clopidogrel allergy	Patient, Patient Proxy, Clinician	Clinician, Patient, Patient Proxy	Ambulatory	Allergy List
Dipyrimadole allergy	Patient, Patient Proxy, Clinician	Clinician, Patient, Patient Proxy	Ambulatory	Allergy List
Medical reasons for exclusion	Physician	Physician	Ambulatory	Documentation
Patient preference reasons for exclusion	Patient, Patient Proxy	Clinician	Ambulatory	Documentation
System reasons for exclusion	Healthcare System	Clinician	Ambulatory	Documentation

874

875 * Note that in this example data elements used to define this measure are modified to use data
876 elements with a higher data quality (e.g., use of problem list for diagnosis instead of billing
877 diagnosis). Since each element is defined within a measure based on the expected authoritative
878 source and health record field, specifications can be more simply stated. Measure requirements
879 can also require the use of certified EHR components and functions such that EHRs can be
880 implemented more effectively to use components designed for more effective patient care. Note
881 that in this ambulatory measure example, the “health record field” assignment is different than
882 that suggested in the original measure. The original requirement was that antiplatelet medication
883 is prescribed and that can be represented as the presence of an order or the presence of the
884 medication on the active medication list. Although not entirely under the control of the ordering
885 physician, the QDS and dataflow framework allow a measure to determine a more patient focused
886 step, that the medication prescription was filled and dispensed. Decisions about which elements

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887 and dataflow objects to select are those of the measure developer. However, this framework
888 provides measure developers with an ability to raise the bar and expect greater accountability for
889 assurance of impact for patients and consumers.

890

891 **Example Measure 2: Venous thromboembolism prophylaxis (inpatient)**

892 This measure assesses the number of patients who received VTE prophylaxis or have
893 documentation why no VTE prophylaxis was given the day of or the day after hospital admission
894 or surgery end date for surgeries that start the day of or the day after hospital admission.²⁰

895

Venous Thromboembolism Prophylaxis (CMS Measure)		
Denominator	Numerator	Exclusion
All patients admitted to the hospital	Patients who received VTE prophylaxis or have documentation why no VTE prophylaxis was given: <ul style="list-style-type: none"> - the day of or the day after hospital admission - the day of or the day after surgery end date for surgeries that start the day of or the day after hospital admission 	<ul style="list-style-type: none"> • Patients less than 18 years of age • Patients who have a length of stay (LOS) < two days and > 120 days • Patients with Comfort Measures Only documented • Patients enrolled in clinical trials • Patients who are direct admits to intensive care unit (ICU), or transferred to ICU the day of or the day after hospital admission with ICU LOS = one day • Patients with ICD-9-CM Principal Diagnosis Code of Mental Disorders or Stroke • Patients with ICD-9-CM Principal or Other Diagnosis Codes of Obstetrics or VTE • Patients with ICD-9-CM Principal Procedure Code of Surgical Care Improvement Project (SCIP) VTE selected surgeries

896

897 The measure provides access to a set of drug names that represent VTE prophylaxis including low
898 dose unfractionated heparin, low molecular weight heparin, fondaparinux and warfarin. A table
899 of acceptable mechanical interventions for prophylaxis is also provided (venous intermittent
900 compression devices and others). If codes for each of the acceptable medications are provided,
901 an inpatient EHR can identify that one of the required medications has been administered or that

²⁰ The Joint Commission, Venous Thromboembolism (VTE) Core Measure Set, VTE-1: Venous Thromboembolism Prophylaxis. Available at: <http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/VTE.htm>.

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902 a mechanical intervention has been used. Exclusions for medical conditions or procedures that
903 would create a risk for bleeding could also be identified in a relatively straightforward manner
904 using electronic data from a fully implemented EHR. Some of the exclusions, comfort measures
905 only and clinical trials for treatment of related conditions require standardization efforts for
906 clinical documentation in a paper environment as well as an electronic care environment.
907 Provider preference is also somewhat vague.

908

909 **Example Measure 2: QDS**

910 QDS for the number of patients who received VTE prophylaxis or have documentation why no VTE
911 prophylaxis was given the day of or the day after hospital admission or surgery end date for
912 surgeries that start the day of or the day after hospital admission.

913

914 Review of this measure for the Quality Data Set (QDS) identified the following quality data
915 elements with reference in parentheses to the representative coding system used for the
916 measure:

- 917 • Admission to hospital
- 918 • Hospital discharge
- 919 • Low dose unfractionated heparin administered
- 920 • Mechanical VTE prophylaxis completed
- 921 • Low molecular weight heparin administered
- 922 • Fondaparinux administered
- 923 • Warfarin administered
- 924 • Provider reason for not giving VTE prophylaxis
- 925 • Birthdate
- 926 • Comfort measure only
- 927 • Clinical trial enrollment
- 928 • Hospital ICU admission
- 929 • Mental disorders active diagnosis

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- 930 • Obstetric diagnoses contraindicating VTE prophylaxis
- 931 • Venous thromboembolism active diagnosis
- 932 • Provider reason for not giving VTE prophylaxis
- 933 • Surgical procedures with risk for VTE

934

935 **Example Measure 2: Dataflow**

936 Data Flow for the number of patients who received VTE prophylaxis or have documentation why
 937 no VTE prophylaxis was given the day of or the day after hospital admission or surgery end date
 938 for surgeries that start the day of or the day after hospital admission.

939

940 As with the ambulatory example provided, the dataflow category framework established by the
 941 HITEP allows a measure developer to select detailed elements, following the data workflow, that
 942 represents the preferred meaning. In this example, a detailed specification provides the chart
 943 abstractor with guidance as to which notations (often free text) in the clinical record are
 944 acceptable to meet the intent for each data element. By more granularly indicating authoritative
 945 sources, recorders, settings and health record fields, specifications can be more specific and
 946 succinct. These elements are described more clearly in the table below. Note that some
 947 elements, depending on local workflow, may be entered by clinicians other than physicians except
 948 where entry by a physician is a requirement to impart the expected meaning.

949

Quality data element	Source	Recorder	Setting	Health Record Field
Admission to hospital	Physician	Clinician	Inpatient	Admission, Discharge, Transfer
Hospital discharge	Physician	Clinician	Inpatient	Admission, Discharge, Transfer
Low dose unfractionated heparin administered	Nurse	Nurse	Inpatient	Medication Administration Record
Mechanical VTE prophylaxis completed	Nurse	Nurse	Inpatient	Nursing intervention documentation
Low molecular weight heparin administered	Nurse	Nurse	Inpatient	Medication Administration Record
Fondaparinux administered	Nurse	Nurse	Inpatient	Medication

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Quality data element	Source	Recorder	Setting	Health Record Field
				Administration Record
Warfarin administered	Nurse	Nurse	Inpatient	Medication Administration Record
Provider reason for not giving VTE prophylaxis	Physician	Physician	Inpatient	Medication list Problem list
Birthdate	Patient, Patient Proxy	Clinician, Registration clerk	Inpatient	Patient demographics
Comfort measure only	Physician, Midlevel practitioner	Physician	Inpatient	Order
Clinical trial	Physician, Midlevel practitioner	Physician, Midlevel practitioner	Inpatient	Registry, Pharmacy Management System
Hospital ICU admission	Physician	Clinician	Inpatient	Admission, Discharge, Transfer
Mental disorders active diagnosis	Physician	Physician	Inpatient	Problem list
Obstetric diagnoses contraindicating VTE prophylaxis	Physician	Physician	Inpatient	Problem list
Venous thromboembolism active diagnosis	Physician	Physician	Inpatient	Problem list
Patient preference for not giving VTE prophylaxis	Patient	Clinician	Inpatient	Medication list Problem list
Surgical procedures performed with risk for VTE	Physician	Physician	Inpatient	Procedures performed

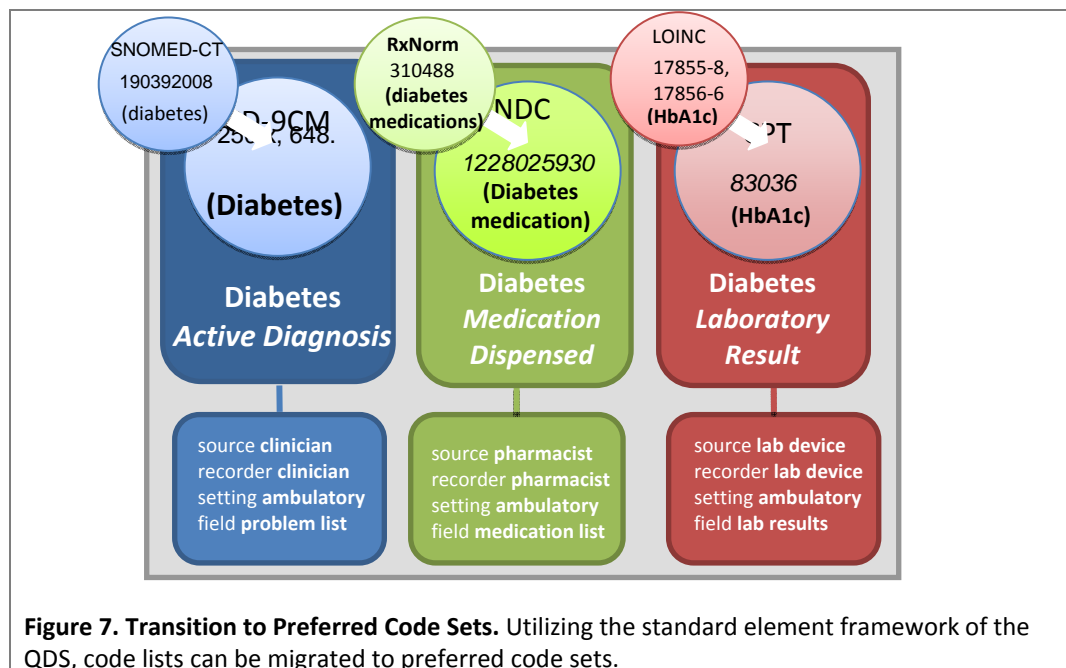
950
 951 As with the ambulatory measure example, this measure is more simply defined by identifying the
 952 authoritative sources form each of the data elements required. Measures retooled in this manner
 953 will encourage actual use of EHR components routinely for real time direct care to patients.
 954 Functional requirements for vendor systems and innovation will focus on components of the EHR
 955 that are essential for safe, efficient and effective care.

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 957
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 959

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960 **IX. PREFERRED FUTURE STATE**

961 The QDS Framework provides a structure upon which to apply quality measure policy
 962 recommendations. A few HITEP-I summary recommendations can be achieved as a direct effect of
 963 the QDS.



- 964
- 965 **1. Evaluate the quality of datatypes as criterion for measure endorsement.** If quality measures
 966 utilize the QDS, the datatypes are explicitly defined by the measure developer.
- 967 **2. Coded, interdisciplinary clinical problem lists should be used in place of billing codes.** To
 968 achieve this, two changes must occur. First, the dataflow must specify the field as “problem
 969 list” rather than “billing.” However, this would not solve the problem entirely, for some EHRs
 970 use billing codes in the problem list as well. Therefore, the code set used to describe diagnoses
 971 must change from ICD-9-CM to SNOMED-CT, as recommended by HITSP. Figure 7
 972 demonstrates replacing an existing standard element using ICD-9-CM with SNOMED-CT or ICD-
 973 10. This change would require evidence of equivalency between the two standard elements,
 974 or the measure may evaluate different populations.

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975 **3. Utilize HITEP datatypes and HITSP recommended code sets.** Figure 7 also demonstrates
976 transitioning code sets from NDC to RxNorm (for medications) and CPT to LOINC (for
977 laboratory tests).

978 **4. Allergies and side effects should be distinguished from each other.** The QDS contains a
979 datatype for “medication allergy” but does not have a datatype for “medication side effect.”
980

981 We will need a transition pathway to bridge from existing measure specifications, code sets and
982 information locations. The QDS provides the framework to represent the current information
983 required for quality measurement yet also indicates specific leverage points for transition: HITSP
984 recommended standard element code sets and code lists, as well as preferred dataflow electronic
985 health record fields.

986

987

988 **X. EXPERT PANEL RECOMMENDATIONS**

989

990 *Recommendation 1:* NQF should communicate with, seek buy-in, educate and train the quality
991 measure supply chain (e.g., study designers, guideline developers, quality measure developers,
992 performance reporting consumers, EHR vendors, CDS developers) regarding the QDS and its
993 associated tools.

994

995 *Recommendation 2:* A measure authoring tool should be created for quality measure developers
996 that can also be used as a resource by the quality measure stakeholders and through which gaps
997 and feedback can be communicated

998

999 *Recommendation 3:* Roles, responsibilities, and opportunities of stakeholders in the quality
1000 measure ecosystem should be enumerated (e.g., ONC, CCHIT, CMS, HITSP, vendors, providers,
1001 measure developers, guideline developers)

1002

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1003 *Recommendation 4:* QDS should be hosted in a publicly available site. Its contents (quality
1004 measures and definitions) should (continue to) be maintained by the measure developers. Over
1005 time, NQF should incorporate use of the QDS as part of the measurement endorsement process.

1006
1007 *Recommendation 5:* A timeline for QDS implementation should be set, enumerating the essential
1008 activities and stakeholders.

1009
1010 *Recommendation 6:* Resources should be provide to measure developers to retool and test high-
1011 priority measures specified for HIT-sensitive measures using the QDS

1012
1013 *Recommendation 7:* Future quality data requirements should use the national priorities and goals
1014 as a guide

1015
1016 *Recommendation 8:* NQF should work with other stakeholders in the quality measure ecosystem
1017 to leverage existing standards work regarding preferred taxonomies (SNOMED-CT, LOINC,
1018 RxNorm) and models (EHR functional model, RIM).

1019
1020 *Recommendation 9:* Comparative testing should be performed to better understand differences in
1021 performance by mode of data collection, including the use of electronic health records.

1022

1023

1024

1025 **XI. CONSIDERATIONS FOR MEANINGFUL USE**

1026

1027 Though outside of the scope of work requested by AHRQ, the HITEP committee agreed that it
1028 would be timely and appropriate for NQF to offer an approach to the measurement of
1029 “meaningful use.” In the next 6-8 months, NQF should endorse a starter set of EHR-based

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- 1030 performance measures reflective of effective or “meaningful” use of health IT functions for
1031 measurement and improvement. The effort requires several steps:
- 1032 • Develop and approve a set of *HIT-sensitive criteria* that can be used to identify clinical
1033 performance measures that highlight the effect of meaningful use of HIT.
 - 1034 • Use the HIT-sensitive criteria to systematically review the NQF portfolio of endorsed/ pipeline
1035 measures to identify **starter set of HIT sensitive measures** that highlight meaningful HIT use in
1036 topical areas related to national priorities and high impact conditions.
 - 1037 • Working with a cadre of measure developers, **retool HIT-sensitive measures** to conform to
1038 EHR-based specifications.

1039

1040 NQF has effectively utilized this approach in the disparities arena. To address measures especially
1041 sensitive to disparities in care, NQF identified a set of primary and secondary criteria used to
1042 identify and endorse a set of measures “sensitive” to the potential effects of disparities on quality
1043 of care. The “HIT-sensitive criteria” can be used to highlight measures that demonstrate the effect
1044 of use of core HIT functions on clinical quality:

- 1045 • e-Prescribing
- 1046 • Preventive services reminders
- 1047 • Health information exchange
- 1048 • Clinical decision support

- 1049
- 1050 Criteria for prioritizing measures for retooling
- 1051 • Is the measure related to a national priority or high impact condition? Does it explicitly impact
1052 value/cost?
 - 1053 • Does the measure effectively leverage HIT?
 - 1054 • Does the measure reflect a more credible representation of quality?
 - 1055 • Is the measure sensitive to effective coordination of care or data sharing across sites,
1056 providers and patients?
 - 1057 • Does the measure reflect the use of innovative, patient-centered data sources (bidirectional)?

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Health IT sensitive criteria may include the following criteria:

- **Does the measure depend on the presence of an EHR and its effective use?**

In order to efficiently report on the measure and demonstrate good results, the organization would need to have implemented a capable EHR and the clinicians would have to be using it effectively

- **Does the measure reflect the use of innovative, patient-centered data sources?**

Examples:

1. Measure includes assessment of patient home monitoring (e.g., blood glucose monitoring)
2. Measure includes patient-reported health status (e.g., completion of PHQ-9 depression screening tool by patients)

- **Is the measure sensitive to effective coordination of care or data sharing across sites and providers?**

Examples:

1. Coordination of care examples: measures include information that would need to be shared across sites (e.g., medication reconciliation), coordination between clinicians (e.g., timely receipt of consult notes).
2. Data sharing example: Percent of surgical site infections (SSIs) occurring within 30 days after operative procedure if no implant left in place – includes capacity to capture infection information from ambulatory care to calculate accurate SSI rate.

With more than 500 measures in the NQF portfolio, available measures could be deemed “health IT sensitive.” The health IT-sensitive starter set should be comprehensive and applicable across healthcare settings. These measures will require the inclusion of key clinical data only available in electronic health record systems (e.g., data from problem list and medication lists), and that encourage use of essential components of the EHR.

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1086 **XII. FUTURE WORK**

1087

1088 **Maintenance of QDS**

1089 The QDS contains quality data elements for measurement use. As measures are created and
1090 continually updated, the QDS will need to reflect these changes. HITEP recommended
1091 maintenance of the QDS content every six months. As part of the NQF measure maintenance
1092 policy, updated measures shall include specifications using the QDS. In the near term, measure
1093 developers should classify data requirements using the framework of the QDS. To facilitate this
1094 process, NQF is currently developing a web-based measure authoring tool that will allow measure
1095 developers to choose elements from the QDS for each measure. A shared authoring tool will also
1096 allow measure developers to share quality data elements used in other measures and by other
1097 measure developers. While this first compilation of the QDS was completed by the NQF, as
1098 measures are created and updated, QDS content generation will be defined by the content
1099 experts: measure developers. NQF will serve as the convener of the QDS, and work to encourage
1100 high-quality data elements and minimize duplication of similar data elements. HITEP
1101 acknowledged that NQF should oversee this reconciliation of quality data elements. These
1102 processes and policies are forthcoming.

1103

1104 The QDS will be used to standardize data requirements of quality measures. It can also be used to
1105 empower CDS and public health applications. Therefore, the QDS should be considered a public
1106 good. HITEP recommended the NQF store the QDS and share the QDS with the general public. The
1107 standard elements used by the QDS will also be defined the measure authoring tool.

1108

1109 **Maintenance of Standard Code Sets**

1110 Standard elements are best housed in a code set repository so it may also be reused for routine
1111 clinical information system implementations, for guideline compliance and for clinical decision
1112 support functions.

1113

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1114 As each set of terms or codes (herein titled ‘code set’ and synonymous with ‘value set,’ or a set of
 1115 specific values or codes) is created, measure developers establish expert panels to represent the
 1116 specific intent of the data element for consistency in performance reporting. Thus, for re-use, the
 1117 specific meaning must be represented in the title and purpose of the code set. A consortium of
 1118 multiple research and public health stakeholders met in Salt Lake City on March 11-12, 2007 to
 1119 establish international guidelines for representing code sets.²¹ The guidelines included specific
 1120 core requirements in addition to the actual codes used. Those requirements are presented in the
 1121 table below:

1122

Code Set Characteristic	Description
Code Set Identifier	A common identifier registered with an appropriate standard organization for common electronic record usage (e.g., HL7 or ISO or ANSI)
Code Set Name	Name for the code set. A standard naming convention will be helpful.
Code Set Definition	Brief description about the concepts in the code set (code set members) as well as the general purpose of code set. Example: All antiplatelet medications used as secondary prevention to decrease the risk of acute myocardial infarction in patients with coronary artery disease. The description clarifies the intended use such that reuse will be encouraged only if the same meaning is intended.
Code System Information	The code system used for building the code set and the code system version used for building the value set.
Code Set Type	Static (all codes are specified, or enumerated) or Dynamic (based on criteria, e.g., identifying only the medication class Angiotensin Converting Enzyme Inhibitors which changes as medications are approved or removed from the market).
Code Set Version	Reference to the edition of the code set, potentially represented as a date (YYYYMMDD).
Code Set Status	Active (current), Inactive (retired)
Date Revised	Date of the current version (revision) of the code set.
Date Created	Generally refers to the published date for the first version of a code set.
Code Set Effective Date	The code set may be based on a coding system that is updated annually (such as ICD-9). A code set based on the next update of the coding system would have an effective date after publication of the coding system with time for implementers to be ready.
Code Set Expiry Date	When the code set or coding system on which it is based will no longer be active (expires).

1123

1124 In many respects, the QDS uses a high impact subset of code sets for implementation of clinical
 1125 systems to commonly identify problems, medication lists, allergies, and other significant
 1126 datatypes identified in this HITEP report consistently across electronic health systems. Impacting

²¹ Consortium: The Centers for Disease Control and Prevention Public Health Information Network, HL7, LexGrid, UK Cancer Grid, US National Cancer Institute, entitled the Value Set Consortium. Summary of Value Set Consortium minutes, 2007, Available at: <http://www.termcorps.com/documents/value-set-summit-minutes-2007-03.doc>.

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1127 implementation of clinical systems prospectively will enable more facile incorporation of
1128 performance monitoring, measurement and clinical decision support.

1129
1130 A code set repository, or registry is required containing the standard elements from which new
1131 quality data elements can be selected. Some of these elements will be represented in more than
1132 one code type since, for the near term, certain code systems are commonly used in electronic
1133 transactions. Alternate code system sets are required to enable transition to future use (e.g., ICD-
1134 9CM to ICD-10), and also to enable transition to preferred code systems to provide more clinical
1135 context (e.g., SNOMED-CT). Using an example of an active diagnosis of diabetes, a number of
1136 options follow:

- 1137
- 1138 - diabetes <all> by ICD-9
 - 1139 - diabetes <all> by SNOMED
 - 1140 - diabetes <all> by ICD-10
 - 1141 - diabetes type 1 by ICD-9
 - 1142 - diabetes type 1 by SNOMED
 - 1143 - diabetes type 1 by ICD-10
 - 1144 - diabetes type 2 by ICD-9
 - 1145 - diabetes type 2 by SNOMED
 - 1146 - diabetes type 2 by ICD-10

1147
1148 A more facile way to display such difference is to list the standard element and to provide links to
1149 each of the related code sets:

- 1150
- | | | | | |
|------|-------------------|-------|--------|--------|
| 1151 | - diabetes <all> | ICD-9 | SNOMED | ICD-10 |
| 1152 | - diabetes type 1 | ICD-9 | SNOMED | ICD-10 |
| 1153 | - diabetes type 2 | ICD-9 | SNOMED | ICD-10 |

1154

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1155 **Measure Authoring Tool**

1156 A near term future step in this process is to develop a measure authoring tool to allow measure
1157 developers to select quality data elements, apply mathematical operators and logic, and create a
1158 computer readable measure specification. As noted in the prior discussions, some concepts are
1159 most effectively handled as part of the measure specification within this future measure authoring
1160 tool. Logic, ranges and concept pairing are expected to occur using such a tool by incorporating
1161 existing quality datatypes within logical expressions.

1162

1163 **Quality Datatype Migration to EHRs**

1164

1165 For example, 'care goal' is a common element used within nursing Plans of Care in various care
1166 settings.²² Such goals as 'ambulation x meters,' or 'improved gas exchange,' or 'patient
1167 understanding of disease specific education' can be discretely defined as functional status,
1168 physical finding and communication in the current model, respectively.

1169

1170 A future action will also require enhancing some of the concepts in the EHR Functional Model,
1171 creation of new concepts and/or creation of a Quality Profile in HL7 that represents the
1172 appropriate concepts as requirements in EHRs.

1173

1174 **XIII. ACKNOWLEDGEMENTS**

1175

1176 This work was conducted under a contract from the Agency for Healthcare Research and Quality.

²² Goals are common within Care Plan phases, and often must be met in order to move a patient from one phase of a Care Plan to another. For example, for a patient to move from the post-operative recovery room to a surgical floor bed, certain vital signs must be stable. Whether these goals are considered met or not met may depend on clinician judgment but for the QDS shall expect parameters to be set for use in measurement or in decision support rules. A typical goal is expressed as an observation scheduled for some time in the future with a particular value in the observation value field. For example, a rule may state that the observation of a heart rate between 60 and 100 must be present at the time of discharge from recovery. A Care Plan may identify this heart rate as a goal for 30 minutes after entry to the recovery unit. (Adapted from HL7 Care Provision Model). Additionally, the EHR Functional Model direct care elements DC.2.2, DC2.2.1.1, and DC2.2.1.2 refer to patient management using plans of care. (HL7 EHR Workgroup Electronic Health Record – System Functional Model, Release 1.1, January 2009, Chapter Three: Direct Care Functions)

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1177 **XIV. APPENDICES**

1178 ***Appendix A. HITEP Roster***

1179

1180 **Paul Tang, MD (Chair)**

1181 Palo Alto Medical Foundation, Palo Alto, CA

1182

1183 **David Bates, MD, MSc**

1184 Brigham and Women's Hospital, Boston, MA

1185

1186 **John Halamka, MD, MS**

1187 CareGroup Health System/Harvard Medical School, Boston, MA

1188

1189 **George Isham, MD, MS**

1190 HealthPartners, Bloomington, MN

1191

1192 **Brent James, MD**

1193 Intermountain Healthcare, Salt Lake City, UT

1194

1195 **Jeffrey Kang, MD, MPH**

1196 CIGNA Healthcare, Hartford, CT

1197

1198 **Norma Lang, PhD, RN**

1199 University of Pennsylvania School of Nursing, Cedarburg, WI

1200

1201 **Blackford Middleton, MD, MPH, MSc**

1202 Partners HealthCare System, Inc., Wellesley, MA

1203

1204 **Dolores Mitchell**

1205 Massachusetts Group Insurance Commission, Boston, MA

1206

1207 **J. Marc Overhage, MD, PhD**

1208 Regenstrief Institute for Health Care, Indianapolis, IN

1209

1210 **Greg Pawlson, MD, MPH**

1211 National Committee for Quality Assurance, Washington, DC

1212

1213 **Eva Powell, MSW**

1214 National Partnership for Women & Families, Washington, DC

1215

1216 **Christopher Queram, MA**

1217 Wisconsin Collaborative for Healthcare Quality, Madison, WI

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1218

1219 **Rick Stephens**

1220 The Boeing Company, Chicago, IL

1221

1222 **John Tooker, MBA, MD**

1223 American College of Physicians, Philadelphia, PA

1224

1225 **Charlene Underwood**

1226 Siemens Healthcare, Malvern, PA

1227

1228 **FEDERAL LIAISONS**

1229

1230 **Carolyn M. Clancy, MD**

1231 Director, Agency for Healthcare Research and Quality, Rockville, MD

1232

1233 **David Hunt, MD, FACS**

1234 Office of the National Coordinator for Health Information Technology

1235

1236 **Michael Rapp, MD, JD**

1237 Centers for Medicare & Medicaid Services, Baltimore, MD

1238

1239 **Jonathan White, MD**

1240 Agency for Healthcare Research and Quality, Rockville, MD

1241

1242 **CONSULTANT**

1243

1244 **Kristine Martin Anderson, MBA**

1245 Booz Allen Hamilton, McLean, VA

1246

1247 **NATIONAL QUALITY FORUM**

1248

1249 **Janet M. Corrigan, PhD, MBA**

1250 President and CEO

1251

1252 **Floyd Eisenberg, MD, MPH, FACP**

1253 Senior Vice President, Health Information Technology

1254

1255 **Helen Burstin, MD, MPH**

1256 Senior Vice President, Performance Measures

1257

1258 **Daniel Rosenthal, MD, MSc, MPH**

1259 Senior Advisor, Health Information Technology

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1260

1261 ***Appendix B. QDS Workgroup Roster***

1262

1263 **David Bates, MD, MSc (Co-Chair)**

1264 Brigham and Women's Hospital, Boston, MA

1265

1266 **Greg Pawlson, MD, MPH (Co-Chair)**

1267 National Committee for Quality Assurance, Washington, DC

1268

1269 **Andy Amster, MSPH**

1270 Kaiser Permanente, West Hollywood, CA

1271

1272 **David Baker, MD, MPH**

1273 Northwestern University Medical School, Chicago, IL

1274

1275 **Richard Bankowitz, MBA, MD**

1276 Premier, Inc, Philadelphia, PA

1277

1278 **Patricia Craig, MS**

1279 The Joint Commission, Oakbrook Terrace, IL

1280

1281 **Crystal Kallem, RHIT**

1282 American Health Information Management Association, Chicago, IL

1283

1284 **Rosemary Kennedy, MBA, RN**

1285 Siemens Healthcare, USA, Malvern, PA

1286

1287 **Karen Kmetik, PhD**

1288 American Medical Assoc - Physician Consortium for Performance Improvement, Chicago, IL

1289

1290 **Eva Powell, MSW**

1291 National Partnership for Women & Families, Washington, DC

1292

1293 **Jacob Reider, MD**

1294 Allscripts, Chicago, IL

1295

1296 **Martin Rice, RN, MSN**

1297 Centers for Medicare and Medicaid Services, Baltimore, MD

1298

1299 **Barbara Rudolph, PhD**

1300 Leapfrog Group, Madison, WI

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- 1301
1302 **Eric Schneider, MD, MSc**
1303 Harvard School of Public Health, Boston, MA
1304
1305 **David Stumpf, MD, PhD**
1306 UnitedHealth Group, Chicago, IL
1307
1308 **Ferdinand Velasco, MD**
1309 Texas Health Resources, Arlington, TX
1310

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1311 ***Appendix C. Dataflow Workgroup Roster***

1312

1313

1314 **Jeffrey Kang, MD, MPH (Co-Chair)**

1315 CIGNA Healthcare, Hartford, CT

1316

1317 **Blackford Middleton, MD, MPH, MSc (Co-Chair)**

1318 Partners HealthCare System, Inc., Wellesley, MA

1319

1320 **Carol Bickford, PhD, RN**

1321 American Nurses Association, Silver Spring, MD

1322

1323 **John Blair, MD**

1324 Taconic IPA, Fishkill, NY

1325

1326 **Michael Cantor, MD, MA**

1327 Pfizer, New York, NY

1328

1329 **Scott Endsley, MD, MSc**

1330 Health Services Advisory Group, Phoenix, AZ

1331

1332 **Paul Fu, MD, MPH**

1333 Lumetra/Illumisys, San Clemente, CA

1334

1335 **David Hopkins, MS, PhD**

1336 Pacific Business Group on Health, San Francisco, CA

1337

1338 **Brian Jacobs, MD**

1339 Children's National Medical Center, Washington, DC

1340

1341 **Andrea Kabcenell, MPH, RN**

1342 The Institute for Healthcare Improvement, Ithaca, NY

1343

1344 **Charles Kennedy, MD**

1345 WellPoint, Thousands Oak, CA

1346

1347 **Deven McGraw, JD, MPH**

1348 Center for Democracy and Technology, Washington, DC

1349

1350 **Rick Moore, FACHE**

1351 National Committee for Quality Assurance, Washington, DC

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1352

1353 **Thomas Payne, MD**

1354 Harborview Medical Center & UW Medicine, Seattle, WA

1355

1356 **Joachim Roski, MPH, PhD**

1357 The Brookings Institution, Washington, DC

1358

1359 **Jesse Singer, DO, MPH**

1360 City of New York Department of Health and Mental Hygiene, New York, NY

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1361

1362 ***Appendix D. Glossary of Terms***

1363

1364 Appendix D provides a glossary for all terms used as QDS datatypes and standard types within the context of this HITEP report.
1365 HITEP committee members recommended the definitions should come from existing definitions established in health IT standard
1366 organizations. Specifically, the EHR Functional Model was recommended. Each definition was reviewed in the context of the EHR
1367 Functional Model.²³ Some are represented but many of the concepts required for quality measurement are not clearly present in
1368 the EHR Functional Model. A future step will be to review with HL7 required updates to the EHR Functional Model to accommodate
1369 the incorporation of quality measurement requirements within the model.

1370

1371 This glossary provides definitions for terms used as QDS datatypes and standard types within the context of this HITEP report. HITEP
1372 committee members recommended the definitions should come from existing definitions established in health IT standard
1373 organizations. Specifically, the EHR Functional Model was recommended. Each definition was reviewed in the context of the EHR
1374 Functional Model. Some are represented but many of the concepts required for quality measurement are not clearly present in the
1375 EHR Functional Model. A future step will be to review with HL7 required updates to the EHR Functional Model to accommodate the
1376 incorporation of quality measurement requirements within the model.

1377

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²³ HL7 EHR Work Group Electronic Health Record – System Functional Model, Release 1.1, January 2009.

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
care goal	care goal	A goal is a defined target or measure to be achieved in the process of patient care. A typical goal is expressed as an observation scheduled for some time in the future with a particular value.	HL7 Care Provision Model
	care plan	The plan of care (care plan) is the structure used by all stakeholders, including the patient, to define the management actions for the various conditions, problems, or issues identified for the target of the plan. It is the structure through which the goals and care planning actions and processes can be organized, planned, communicated, and checked for completion.	HL7 Care Provision Model
communication	communication provider to provider	The provision of any communication from one clinician to another regarding findings, assessments, plans of care, consultative advice, instructions, educational resources, etc.	EHR Functional Model DC.3.2 (Support Clinical Communication)
	communication to patient	Providing any communication to the patient. E.g., results, findings, plans for care, medical advice, instructions, educational resources, appointments, results, etc.	EHR Functional Model partially supports by: DC.3.2 (Support Clinical Communication) DC.1.6.2 (Manage Patient Specific Care Plan) DC.3.2.4 (Patient, Family and Care Giver Education) DC.1.9 (Generate and Record Patient-Specific Instructions) DC.2.3.2 (Support for Medication and Immunization Administration)
	communication from patient	Receive response from a patient with respect to any aspect of the care provided.	EHR Functional Model DC.3.2 (Support Clinical Communication)
Condition/diagnoses/problem		A problem, diagnosis or condition is a scientific interpretation of result, assessment and treatment response data that persists over time and tends to require intervention or management. It is used to guide planning, implementation, treatment and evaluation. A problem or condition includes, but is not limited to chronic conditions, diagnoses, or symptoms, functional limitations, visit or stay-specific conditions.	EHR Functional Model DC.2.1.3 (Support for Identification of Potential Problems and Trend) DC.1.4.3 (Manage Problem List)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
	diagnosis active	A problem, diagnosis or condition that is currently monitored, tracked or is a factor that must be considered as part of the treatment plan in progress.	EHR Functional Model Glossary: Problem list DC.2.1.3 (Support for Identification of Potential Problems and Trend) DC.1.4.3 (Manage Problem List)
	diagnosis, risk-of	Potential for development of problems or conditions determined by a risk calculator scale. Examples: Braden Score for Predicting Pressure Sore Risk*, Morse Fall Risk Scale, Pneumonia Severity Index** * Available at: http://www.bradenscale.com/braden.PDF ** Available at: http://pda.ahrq.gov/clinic/psi/psicalc.asp	The EHR Functional Model provides some support for assessment but no direct discussion of risk calculators. DC.2.1.2: (Support for Patient Context Driven Assessments) DC.2.1.3: (Support for Identification of Potential Problems and Trends)
	diagnosis, factored risk	Potential for development of problems or conditions determined by specific factors defined within the measure by the measure developer. Most often these risks can be defined as a composite of several QDS elements that, based on evidence, in combination represent a risk of a specific condition or negative outcome.	The EHR Functional Model provides some support for assessment but no direct discussion of factored risk. DC.2.1.2: (Support for Patient Context Driven Assessments) DC.2.1.3: (Support for Identification of Potential Problems and Trends)
	diagnosis family history	Problems, conditions and diagnoses existing currently or in the past for a patient's family members.	Problems, conditions and diagnoses existing currently or in the past for a patient's family members.
	diagnosis past history	Problems, conditions and diagnoses that have occurred in the past for the patient under treatment.	Problems, conditions and diagnoses that have occurred in the past for the patient under treatment.
Device	device applied	Indication that equipment designed to treat, monitor or diagnose a patient's status is in use. An example in a venous thromboembolism measure is that an anti-thrombotic device has been placed on the patient's legs to prevent thromboembolism.	DC.2.4.2 (Support for Non-medication Ordering) supports the ordering of a device, but no clear reference is identified to represent documentation that a device is in use.
	device order	Equipment designed to treat, monitor or diagnose a patient's status is ordered.	EHR Functional Model DC.2.4.2 (Support for Non-medication Ordering)
	device offered	Equipment designed to treat, monitor or diagnose a patient's status is offered to the patient.	EHR Functional Model DC.2.4.2 (Support for Non-medication Ordering)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
			although 'offered is not specified.'
	device refused	Equipment designed to treat, monitor or diagnose a patient's status has been refused by the patient.	Some of the concepts are addressed in the following EHR Functional Profile sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
encounter	encounter	A patient encounter represents interaction between a healthcare provider and a patient as with a face-to-face or otherwise billable visit for any form of diagnostic treatment and/or therapeutic event.	EHR Functional Model S.3.1 (Encounter/Episode of Care Management) S.3.1.2 (Encounter Specific Functionality) S.3.1.5 (Other Encounter and Episode of Care Support)
functional status	functional status	The capacity to engage in activities of daily living and social role activities.	No specific reference
individual characteristic	patient characteristics	Specific information about the patient, including demographics	EHR Functional Model DC.1.1.2 (Manage Patient Demographics) S.1.4.1 (Patient Demographics)
	provider characteristics	Specific information about the clinician provider or the facility caring for the patient.	EHR Functional Model S.1.3: (Provider Information) S.1.3.4: (Provider's Location(s) or Office(s)) S.1.3.5: (Team/Group of Providers Registry or Directory)
intervention (non-procedure)	intervention administered	An intervention (non-procedure) has been applied to the patient. Intervention (non-procedure) is a patient care process provided directly to a patient by a care provider requiring physical interaction to assist or direct a patient for an activity or to apply single use or durable medical equipment. Examples include assisted ambulation, physical therapy, speech/language pathology evaluation, dressing changes, placement of antithrombotic devices, insertion or removal of	The EHR Functional Model lists some options for managing non-medication orders but it does not provide for all of the workflow steps required by this QDS data element. DC.1.7.2.1 (Manage Non-Medication Patient-Care Orders)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		intravascular access. Interventions (non-procedure) are distinguished from procedures in that they are not directly billable nor are they included in billing transactions.	
	intervention completed	An intervention (non-procedure) has been completed.	The EHR Functional Model lists some options for managing non-medication orders but it does not provide for all of the workflow steps required by this QDS data element. DC.1.7.2.1 (Manage Non-Medication Patient-Care Orders)
	intervention discontinued	An intervention (non-procedure) has been stopped (prior to expected completion indications or time).	The EHR Functional Model lists some options for managing non-medication orders but it does not provide for all of the workflow steps required by this QDS data element. DC.1.7.2.1 (Manage Non-Medication Patient-Care Orders)
	intervention offered	The patient is provided an option to receive an intervention.	The EHR Functional Model lists some options for managing non-medication orders but it does not provide for all of the workflow steps required by this QDS data element. DC.1.7.2.1 (Manage Non-Medication Patient-Care Orders)
	intervention refused	The patient has declined the offer of an intervention.	Some of the concepts are addressed in the following EHR Functional Profile sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
laboratory test	laboratory test performed	A diagnostic study in the clinical laboratory (traditionally Chemistry, Hematology, Microbiology, Serology, Urinalysis, Blood Bank) has been completed. Depending on the point in the clinical workflow desired by the measure, various options are provided -	EHR Functional Model includes: <u>Glossary</u> Active Order: Active – In a state of action Order – Request for a certain procedure to be

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		offered, refused, ordered, performed and resulted.	performed DC.2.4.2 (Support for Non-medication Ordering: Statement) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Source) DC.2.4.3 (Support for Result Interpretation) DC.1.8.3 (Manage Results)
	laboratory test order	A diagnostic study in the clinical laboratory (traditionally Chemistry, Hematology, Microbiology, Serology, Urinalysis, Blood Bank) has been ordered. Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused, ordered, performed and resulted.	EHR Functional Model includes: <u>Glossary</u> Active Order: Active – In a state of action Order – Request for a certain procedure to be performed. DC.2.4.2 (Support for Non-medication Ordering: Statement) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Source) DC.2.4.3 (Support for Result Interpretation) DC.1.8.3 (Manage Results)
	laboratory test result	The result of a diagnostic study in the clinical laboratory (traditionally Chemistry, Hematology, Microbiology, Serology, Urinalysis, Blood Bank). Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused, ordered, performed and resulted.	EHR Functional Model includes: <u>Glossary</u> Active Order: Active – In a state of action Order – Request for a certain procedure to be performed. DC.2.4.2 (Support for Non-medication Ordering: Statement) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Source) DC.2.4.3 (Support for Result Interpretation) DC.1.8.3 (Manage Results)
	laboratory test offered	A diagnostic study in the clinical laboratory (traditionally Chemistry, Hematology, Microbiology, Serology, Urinalysis, Blood Bank) has been offered to	EHR Functional Model includes: <u>Glossary</u> Active Order:

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		the patient or patient proxy. Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused, ordered, performed and resulted.	Active – In a state of action Order – Request for a certain procedure to be performed. DC.2.4.2 (Support for Non-medication Ordering: Statement) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Source) DC.2.4.3 (Support for Result Interpretation) DC.1.8.3 (Manage Results)
	laboratory test refused	A diagnostic study in the clinical laboratory (traditionally Chemistry, Hematology, Microbiology, Serology, Urinalysis, Blood Bank) has been refused by the patient or patient proxy. Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused, ordered, performed and resulted.	Some of the concepts are addressed in the following EHR Functional Model sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
Location	location	The location within a healthcare setting at which a patient is located, OR a setting from which a patient is received (e.g., home, acute care hospital, skilled nursing, etc.), OR a setting to which a patient is released (e.g., home, acute care hospital, skilled nursing, rehab, etc.)	The EHR Functional Model has components that refer to some of the concepts required by the "location" data element, but 'received from' and 'transferred/sent to' concepts are not specifically identified. S.1.4.2 (Patient's Location Within a Facility)
medication	medication administered	A record by the care provider that a medication actually was administered and whether or not these facts conform to the order. Appropriate time stamps for all medication administration are generated.	EHR Functional Model DC.1.8.1 (Manage Medication Administration)
	medication adverse event	In the instance of a quality measure, a medication adverse event is an unexpected or dangerous reaction to a medication. Serious adverse events are those that are fatal, life-threatening, permanently/significantly disabling, those that require	EHR Functional Model DC.1.4.1 (Manage Allergy, Intolerance, and Adverse Reaction List)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		or prolongs hospitalization, those that lead to congenital anomaly or require intervention to prevent permanent impairment or damage. A time/date stamp is required as are notations indicating whether item is patient reported and/or provider verified.	
	medication allergy	A medication allergy is an immunologically mediated reaction that exhibits specificity and recurrence on re-exposure to the offending drug. A time/date stamp is required as are notations indicating whether the item is patient reported and/or provider verified.	EHR Functional Model DC.1.4.1 (Manage Allergy, Intolerance, and Adverse Reaction List)
	medication discontinued	A record by the care provider that a medication has been purposely stopped (or discontinued). Medications may be discontinued based on an order by a physician (usually an inpatient practice), notification to a patient to stop taking a medication (ambulatory), or notification from a patient to a care provider that the patient has independently stopped taking the drug. Appropriate time stamps for all medication discontinuation are generated.	The EHR Functional Model has some components of this definition in the following actions. Further analysis is required. DC.1.7.1 (Manage Medication Orders) DC.1.4.2 (Manage Medication List) DC.1.8.1 (Manage Medication Administration)
	medication dispensed	A medication prescription is filled by a pharmacy the medication has been provided to the patient or patient proxy. In the ambulatory setting, medications are primarily taken directly by patients and not directly observed. Hence, dispensed is the closest health provider documentation of medication compliance. In settings where patients attest to taking medications in electronic format (perhaps a Personal Health Record) patient attestation of 'medication taken' may be available.	The EHR Functional Model has concepts with respect to medication ordering, management and administration. Dispensed (or taken by the patient in the context of ambulatory personal health record patient attestation) is not specifically identified. DC.1.7.1 (Manage Medication Orders) DC.1.4.2 (Manage Medication List) DC.1.8.1 (Manage Medication Administration)
	medication intolerance	Medication intolerance is a reaction in specific patients representing a low threshold to the normal pharmacological action of a drug. Side effects experienced do not represent adverse events or allergies. A time/date stamp is required as are	EHR Functional Model DC.1.4.1 (Manage Allergy, Intolerance, and Adverse Reaction List)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		notations indicating whether the item is patient reported and/or provider verified.	
	medication order	A request by a physician or appropriately licensed care provider to a pharmacy to provide medication to a patient. The request is in the form of prescriptions or other medication orders with detail adequate for correct filling and administration.	EHR Functional Model DC.1.7.1 (Manage Medication Orders)
	medication offered	A specific medication has been offered to the patient or patient proxy.	The EHR Functional Model has concepts with respect to medication ordering, management and listing. Offered is not specifically identified. DC.1.7.1 (Manage Medication Orders) DC.1.4.2 (Manage Medication List)
	medication refused	A medication has been refused by the patient or patient proxy.	Some of the concepts are addressed in the following EHR Functional Profile sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
physical finding	physical exam finding	A physical examination is the evaluation of the patient's body to determine its state of health. The techniques of inspection include palpation (feeling with the hands and/or fingers), percussion (tapping with the fingers), auscultation (listening), and smell. Measurements may include vital signs (blood pressure, pulse, respirations) as well as other clinical measures (such as expiratory flow rate, size of lesion, etc.).	The EHR Functional Profile provides some direction for management of physical examination findings. Further evaluation is required. DC.1.8.4 (Manage Patient Clinical Measurements) DC.1.8.5 (Manage Clinical Documents and Notes)
preference	patient preference	Health care treatment choices influenced by but not limited to language, religious, or cultural preferences selected by the patient and family.	Some of the concepts are addressed in the following EHR Functional Model sections, patient refusal of a procedure, intervention, service or treatment is not

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
			clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
	provider preference	Health care treatment choices by the care provider based on knowledge of the patient's clinical status and findings. Synonymous with 'medical reason' for inclusion or exclusion of a patient in a measure population.	Not covered in the EHR Functional Profile
procedure	procedure history	A procedure has been completed in the past and includes a time/date stamp.	The EHR Functional Model somewhat covers this topic, but not completely: DC.1.1.3.1 (Capture Data and Documentation from External Clinical Sources Statement) DC.1.8.3 (Manage Results)
	procedure order	A request by a physician or appropriately licensed care provider to an appropriate provider or facility to perform a procedure on a patient. The request may be in the form of a consultation or a direct order to the facility or organization that performs the procedure.	The EHR Functional Model provides support for non-medication ordering including: <ul style="list-style-type: none"> · supplies such as <ul style="list-style-type: none"> · 4x4's and ACE bandages · non-medical devices such as TTY phones for the hearing impaired · groups of supplies or kits common to an organization · simple durable medical equipment (DME) such as crutches or walkers · complex DME such as wheelchairs and hospital beds · therapies and other services that may require a referral and/or an authorization for insurance coverage It is not clear that procedures as defined are covered in this EHR FM section DC.2.4.2 (Support for Non-Medication Ordering)
	procedure result	A procedure has been completed. Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused,	The EHR Functional Model provides support for procedure result management in the following sections: DC.2.4.3 (Support for Result Interpretation)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
		ordered, performed and resulted.	DC.1.1.3.1 (Capture Data and Documentation from External Clinical Sources)
	procedure offered	A request by a physician or appropriately licensed care provider to a pharmacy to provide medication to a patient. The request is in the form of prescriptions or other medication orders with detail adequate for correct filling and administration.	The EHR Functional Model does not have a clear representation for procedure offered.
	procedure refused	A procedure has been refused by the patient or patient proxy.	Some of the concepts are addressed in the following EHR Functional Model sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
	procedure performed	A procedure has been completed. Depending on the point in the clinical workflow desired by the measure, various options are provided - offered, refused, ordered, performed and resulted.	The EHR Functional Model provides support for procedure result management in the following sections: DC.2.4.3 (Support for Result Interpretation) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Sources)
satisfaction	satisfaction	Satisfaction is measured most often with a validated survey tool. The most common tool is the Consumer Assessment of Healthcare Providers and Systems (CAHPS - details available at: https://www.cahps.ahrq.gov/default.asp).	The EHR Functional Model does not provide support for satisfaction determination.
symptom	symptom active	A symptom is a subjective evidence of disease or physical disturbance experienced by a patient. An active symptom is one identified during the current encounter.	The EHR Functional Model does not directly address symptoms. DC.1.2 (Manage Patient History) has reference to history by does not directly state symptoms. Assessments that may include symptom identification include: DC.2.1.1 (Support for Standard Assessment)

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
	symptom assessed	A symptom is a subjective evidence of disease or physical disturbance experienced by a patient. Assessment is part of the care provider activity during the current encounter.	<p>DC.2.1.2 (Support for Patient Context-Driven Assessments) DC.2.1.3 (Support for Identification of Potential Problems and Trends)</p> <p>The EHR Functional Model does not directly address symptoms. DC.1.2 (Manage Patient History) has reference to history by does not directly state symptoms. Assessments that may include symptom identification include: DC.2.1.1 (Support for Standard Assessment) DC.2.1.2 (Support for Patient Context-Driven Assessments) DC.2.1.3 (Support for Identification of Potential Problems and Trends)</p>
diagnostic study	diagnostic study order	A request by a physician or appropriately licensed care provider to an appropriate provider or facility to perform a diagnostic on a patient. The request may be in the form of a consultation or a direct order to the facility or organization that performs the diagnostic study. Diagnostic studies are those that are not performed in the clinical laboratory. Such studies include but are not limited to imaging studies, cardiology studies (electrocardiogram, treadmill stress testing), pulmonary function testing, vascular laboratory testing, and others.	<p>The EHR Functional Model provides support for non-medication ordering including· supplies such as</p> <ul style="list-style-type: none"> · 4x4's and ACE bandages · non-medical devices such as TTY phones for the hearing impaired · groups of supplies or kits common to an organization · simple durable medical equipment (DME) such as crutches or walkers · complex DME such as wheelchairs and hospital beds · therapies and other services that may require a referral and/or an authorization for insurance coverage <p>It is not clear that procedures as defined are covered in this EHR FM section DC.2.4.2 (Support for Non-Medication Ordering)</p>

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Standard Element	Quality Data Element	HITEP Definition	EHR Functional Model / HL7 Reference
	diagnostic study result	The result, described in concepts or numerical values of a diagnostic on a patient. Diagnostic studies are those that are not performed in the clinical laboratory. Such studies include but are not limited to imaging studies, cardiology studies (electrocardiogram, treadmill stress testing), pulmonary function testing, vascular laboratory testing, and others.	The EHR Functional Model provides support for diagnostic study result management in the following sections: DC.2.4.3 (Support for Result Interpretation) DC.1.1.3.1 (Capture Data and Documentation from External Clinical Sources)
	diagnostic study offered	An offer or suggestion to a patient for a diagnostic study. Diagnostic studies are those that are not performed in the clinical laboratory. Such studies include but are not limited to imaging studies, cardiology studies (electrocardiogram, treadmill stress testing), pulmonary function testing, vascular laboratory testing, and others.	The EHR Functional Model does not have a clear representation for diagnostic study offered.
	diagnostic study refused	A diagnostic study has been refused by the patient or patient proxy.	Some of the concepts are addressed in the following EHR Functional Model sections, patient refusal of a procedure, intervention, service or treatment is not clearly defined in the EHR FM. Related sections: DC.2.2.4 (Support Self Care) DC.1.3.1 (Manage Patient and Family Preferences) DC.1.3.3: (Manage Consents and Authorizations) DC.2.3.1.2 (Support for Patient Specific Dosing and Warnings) DC.1.3.2 (Manage Patient Advance Directives)
system characteristic	system characteristic	The structural configuration of an organization, e.g., nursing staff ratios, availability of durable medical equipment, health information technology structures (e.g., eprescribing), and invasive procedure capabilities.	The EHR Functional Model addresses nurse staffing but not all system characteristics. S.3.6 Acuity and Severity: Statement
Survey	Patient survey	Specific surveys addressing patients	The EHR Functional Model does not have a clear representation for surveys.
	provider survey	Specific surveys addressing providers	The EHR Functional Model does not have a clear representation for surveys.

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1379 ***Appendix E. Environmental Scan***

**Using Electronic Data to Inform Quality Improvement:
An Environmental Scan of Current Initiatives**

A Report for the National Quality Forum

Submitted by Booz Allen Hamilton

February 2, 2009

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I. Introduction

Many healthcare policy and industry leaders view interoperable health information technology (health IT) as a critical tool to facilitate improvement of care delivered in the United States.¹ Specifically, interoperable health IT has been promoted as being able to:

- ▶ Facilitate collection of data for quality improvement initiatives and public health disease surveillance;
- ▶ Facilitate coordination of care across healthcare institutions, thus reducing duplication of services, decreasing the likelihood of adverse events, and improving the quality of care;
- ▶ Automate and streamline clinical workflow, closing loops in communication that can result in delays or gaps in care; and
- ▶ Aid provider decision-making capability through the use of evidence-based clinical decision support.²

Electronic health records (EHRs) in particular are seen as an important health IT tool that can enable the efficient collection and exchange of clinical data to inform quality improvement. However, widespread adoption of current commercially-available EHRs will not, in and of itself, provide the data needed to support healthcare quality measurement. Quality measures and EHRs must co-evolve to support quality improvement and automated measurement.

The challenges to using EHRs to support quality begins with data capture. Data required for today's quality measures are often captured in unstructured fields or in free text. EHR architectures, which are designed primarily to support care are often suboptimized for population analysis. Additionally, while numerous interoperability standards have been harmonized to support information sharing, the standardization of data for quality measurement is in its early stages.

In an effort to improve the ability of EHRs to support quality measurement and improvement efforts, the Agency for Healthcare Research and Quality (AHRQ) contracted with the National Quality Forum (NQF) in 2007 to convene the Health Information Technology Expert Panel (HITEP). AHRQ charged the HITEP (referred to in this report as the HITEP 1) with identifying and recommending a set of common data elements for standardization to enable automation of a prioritized set of Ambulatory Quality Alliance (AQA) and Hospital Quality Alliance (HQA) measures through EHRs and Health Information Exchanges. The HITEP 1 provided the Health Information Technology Standards Panel (HITSP) with a listing of common data elements used across a prioritized set of measures for them to identify standards for how these data elements could be expressed. In addition, the HITEP 1 developed a set of recommendations that outlined specific actions that could be taken to improve the ability of the quality measurement and health IT enterprise to support quality improvement. These recommendations targeted key audiences including HITSP and the standards development organizations with which it works, the Certification Commission for Health Information Technology (CCHIT), EHR vendors, measure developers, and the NQF.³

AHRQ has now contracted with NQF to re-convene the HITEP and build upon its earlier efforts. Specifically, AHRQ has charged the second HITEP with defining a draft “quality data set” (QDS) that could be used nationwide to support automated, patient-centric, and longitudinal quality measurement. The QDS was conceived based on a recommendation from the American Health Information Community (AHIC) Quality Workgroup. The AHIC Quality Workgroup’s recommendation states:

“The QDS refers to a minimum set of data elements or types of data elements that can be used as the basis for developing harmonized and machine-computable quality measures. More specifically, the QDS will serve as the basis for prioritizing data elements for inclusion in EHRs and other health IT systems and for prioritizing the development of standards for interoperability, data export, and data storage and for prioritizing related certification criteria.”⁴

In addition, AHRQ charged the HITEP with gathering, synthesizing and refining clinical workflow maps and identifying opportunities within these workflows to apply patient inclusion criteria in measure populations, gather performance measurement data, and provide clinical decision support. The goal of this effort is to determine how best to gather data as a seamless part of care delivery, to facilitate improved quality measurement and reporting, and drive improved care outcomes.⁵

NQF contracted with Booz Allen Hamilton (Booz Allen) to conduct an environmental scan of current initiatives that use electronic clinical data in quality measurement and improvement initiatives. The goal of this environmental scan is to characterize current efforts, identify areas in which the electronic data standards for structured clinical data are needed, and share this information with the HITEP to inform their efforts to conceptualize and define the QDS.

The remainder of this report is organized as follows:

- ▶ **Section II: Methodology** describes Booz Allen’s methods for conducting the environmental scan, which included a literature review and targeted stakeholder interviews.
- ▶ **Section III: Findings by Key Topic Area** groups the research from the literature review and the data captured from the stakeholder interviews into three topic areas: an overview of organizations that are contributing to the transformation of the quality measurement and improvement enterprise and its movement towards use of electronic data sources; the current landscape of quality measurement; and a description of current approaches for quality measurement and improvement based on information supplied by the interviewees.
- ▶ **Section IV: Recommendations to the HITEP** discusses the recommendations received from the targeted stakeholder interviews. The responses have been categorized into technical, policy and business recommendations.

II. Methodology

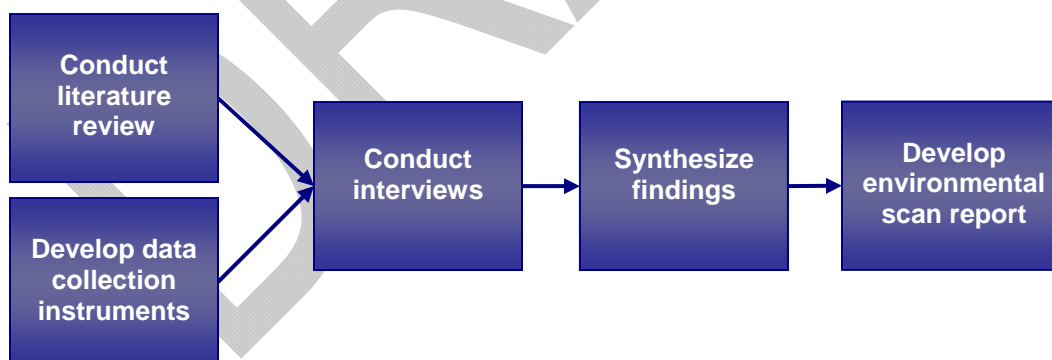
Booz Allen used a two-pronged approach to conduct the environmental scan. This approach consisted of:

- ▶ A **literature review** of published data and current initiatives that describe how electronic clinical data are being used to inform quality improvement initiatives and where data standards for structured clinical data are needed.
- ▶ Primary data collection through **targeted interviews** of organizations that are using and exchanging electronic data to inform their quality improvement efforts.

Booz Allen anticipated that there would be limited insights gathered from the literature review since few studies target the specific areas of interest to the NQF and the HITEP. The literature review did, however, illuminate initiatives that are aggregating electronic clinical and administrative data and fed the list of potential stakeholders to be interviewed. As there is a wealth of anecdotal learning that could inform the NQF HITEP efforts, Booz Allen interviewed 20 key stakeholders from relevant pilots, health information exchange initiatives and provider groups to help inform NQF's understanding of barriers and enablers to interoperability, integration of data from multiple sources, and areas in which standardized electronic clinical data could be used to help advance quality of care. The stakeholder organizations varied by size, region of country, and maturity of health IT implementation.

Figure 1. Environmental Scan Methodology depicts the steps conducted to develop the Environmental Scan Report. Additional details on the approach used to carry out each step are described below.

Figure 1. Environmental Scan Methodology



Conduct literature review: Booz Allen conducted a literature review of published reports, studies, and publicly available information. The review focused on the successes that have been achieved and barriers have been faced in efforts to combine electronic clinical and administrative data from multiple sources for quality improvement purposes and to identify the organizations undertaking such efforts. A primary Google search was conducted on each of the following organizations: “Better Quality Information to Improve Care for Medicare Beneficiaries (BQI) pilots”, “Nationwide Health Information

Network (NHIN) Trial Implementation Sites”, “Regional Health Information Organizations (RHIOs)”, and “Health Information Exchanges (HIEs).”

The literature review also included the identification of articles, reports, and other relevant documentation through structured internet searches using search engines such as PubMed, Biomed Central, and Google. In addition, Booz Allen reviewed information from the websites of key players in the health IT and quality arena including (but not limited to) AHRQ, Centers for Medicare and Medicaid Services (CMS), NQF, the U.S. Department of Health and Human Services (HHS), Indian Health Service (IHS), AHIC, Geisinger Health System, Intermountain Healthcare, Partners Health, and Blue Cross Blue Shield (BCBS). Examples of keywords used to search these databases can be seen in Figure 2. Representative Literature Review Search Terms. In addition, searches on specific programs were also conducted. Booz Allen also examined the citations from relevant articles to obtain additional articles for review.

Figure 2. Representative Literature Review Search Terms

Representative Literature Review Search Terms	
<ul style="list-style-type: none"> • EHR, clinical research • Collaborative, performance measure(s) • EHR, quality measure(s) / performance measure(s), barrier(s) • EHR, quality measure(s) / performance measure(s), success(es) • EHR, quality measure(s) / performance measure(s) • Clinically enriched claims data • Interoperability standards, health IT, quality • Health IT standards 	<ul style="list-style-type: none"> • Health Information Exchange • Health IT, EHR • Health IT, quality measurement / performance measurement • EHR, quality measurement / performance measurement • Performance Measure Using EHR • Using electronic health records to collect patient-specific performance measures • Clinical Workflow, EHR • Clinical Workflow, quality measurement / performance measurement

Develop data collection instruments: To ensure a systematic approach to primary data collection, Booz Allen developed interview guides to facilitate the interviews. One instrument was developed to collect information from collaborative entities such as HIEs, employer-sponsored collaborations, and the BQI and NHIN grantees. A separate instrument was developed to collect data from provider groups, such as physicians, hospitals, and healthcare systems. In order to adhere to Office of Management and Budget (OMB) regulations requiring that government-sponsored data collection efforts limit the burden of data collection on the general public to no more than nine entities without OMB clearance, Booz Allen conducted interviews with nine non-governmental entities for each of these two primary data collection efforts described above. A full list of interviewed stakeholders is included Appendix A: Interviewed Stakeholders.

It is Booz Allen’s practice to use such guides to facilitate discussion during the course of an interview with the understanding that each interviewee will bring unique perspectives and insights, and therefore some questions may not be appropriate for each individual interviewee. The guides were informed by the findings from the literature review and from our historical expertise in the areas of quality measurement reporting and health IT interoperability. Topics in the interview guide included:

- ▶ General characteristics of quality measurement and improvement initiatives in which the organization participates
- ▶ Data categories collected and their respective sources
- ▶ Data shared across settings to facilitate continuity of care and quality measurement
- ▶ Challenges and gaps in capturing or aggregating standardized data through EHRs or other clinical health IT systems
- ▶ Recommendations for improving the standardization of the clinical data collected and for improving how health IT could be enhanced as a data source to support quality measurement and improvement

Conduct interviews: Booz Allen identified the organizations to be interviewed through the literature review and in collaboration with the NQF. Booz Allen and the NQF identified specific stakeholder groups to include in the interview group to ensure multiple perspectives were adequately represented. With a maximum of 20 interviews possible, Booz Allen and the NQF then prioritized stakeholders within these groups who are innovators and have experience in the use of electronic data for quality measurement.

Stakeholder discussions were structured as 45 to 60 minute conference calls conducted by a two-person team. At the NQF's request, Booz Allen asked during each interview for key pieces of documentation that would facilitate the HITEP's efforts to conceptualize a QDS and begin their assessment of clinical workflow maps. The documentation requested included:

- ▶ Data dictionaries, data maps, or other relevant documentation that outlined how electronic (clinical) data were mapped to the measures that a given organization was collecting. NQF deemed that this information would be useful for the HITEP to consider when making determinations regarding what data elements or data types to focus on for inclusion in the QDS.
- ▶ Clinical workflow maps for the NQF HITEP to analyze to determine mechanisms and opportunities within the workflows for identifying patients who are eligible for inclusion in the measure populations, for gathering performance measurement data, and for providing clinical decision support to optimize performance in targeted areas.

Materials that were received served to augment Booz Allen's understanding of the topics described above and were provided to the NQF HITEP to support their own analyses.

Synthesize findings: Booz Allen synthesized the findings from the literature review and stakeholder interviews and reviewed the resulting data to identify key themes as they relate to data collection, measurement, use of electronic data, and challenges associated with capturing or aggregating standardized data through EHRs or other clinical health IT systems. Additionally, interviewee recommendations related to standardization were categorized into technical, business and policy recommendations. To the extent possible, the recommendations were then ordered, within their respective categories, by the number of times they were recommended to help the HITEP in their assessment of the recommendations.

As previously mentioned, the literature review was limited in its ability to provide insights for the targeted areas, so the interviews provided significant input into this report. However it is important to note that the interviewed stakeholders do not constitute a representative sample of the healthcare industry and their responses cannot be extrapolated to represent organizations beyond the interview sample.

Develop environmental scan report. The findings were then populated into a draft report that was provided to the NQF for their review. Based on this review, Booz Allen made modifications to the document and submitted a final draft to the NQF prior to the HITEP kick-off meeting in February 2009.

DRAFT

III. Findings by Key Topic Areas

As mentioned in the introduction, the goals of this environmental scan are to characterize current initiatives that are using electronic clinical data in quality measurement and improvement; identify areas in which electronic data standards for structured clinical data are needed; and share this information with the HITEP to inform their efforts to conceptualize and define the QDS. The section below outlines findings from the environmental scan by key topic areas, including:

- A. Initiatives to transform the quality measurement and improvement enterprise using electronic data sources.
- B. The current landscape of quality measurement.
- C. Approaches to quality measurement and improvement using electronic clinical data, including a discussion of its impact on clinical workflow, health information exchange to facilitate continuity of care, and key challenges.

A. Initiatives to transform the quality measurement and improvement enterprise

There are a number of initiatives in place today that are working to drive quality and health IT interoperability initiatives that are relevant to the NQF HITEP's efforts. They can be categorized, as seen in Figure 3, into two distinct groups:

- ▶ **Enabling organizations** that are focused on developing and/or implementing the processes and/or technical frameworks for exchanging electronic data; and
- ▶ **Implementing organizations** that are exchanging clinical data electronically for quality improvement.

Figure 3. Relevant Initiatives Driving Quality and Health IT Interoperability Activities

Enabling Organizations	Implementing Organizations
<ul style="list-style-type: none">• Agency for Healthcare Research and Quality• Centers for Medicare and Medicaid Services• Certification Commission for Healthcare Information• Healthcare Information Technology Standards Panel• High-Value Health Care Project• Integrating the Healthcare Enterprise• National Committee on Vital and Health Statistics• National eHealth Collaborative• Quality Collaboratives<ul style="list-style-type: none">- Alliance for Pediatric Quality- Collaborative for Performance Measure Integration with EHR Systems	<ul style="list-style-type: none">• Better Quality Information to Improve Care for Medicare Beneficiaries Pilots• Health Information Exchanges• National Health Information Network• Private Sector Efforts<ul style="list-style-type: none">- Health Plans- Providers- Provider Organizations

1. ENABLING ORGANIZATIONS

The enabling organizations described below each play a critical role in creating and strengthening the infrastructure through which standardized electronic data can be captured and used to inform quality measurement and improvement. They span the public and private sectors and also include public-private collaboratives.

Agency for Healthcare Research and Quality is the lead Federal agency charged with improving the quality, safety, efficiency, and effectiveness of healthcare, which includes health IT. In an effort to support and stimulate investment in health IT, AHRQ has made more than \$260 million in grants and contracts to organizations in 41 states, with a special focus on rural and underserved areas. Through these efforts, along with others, AHRQ and its partners seek to identify health IT adoption and implementation challenges and subsequent tools needed to support hospitals and clinicians in their adoption and implementation of health IT.⁶

Centers for Medicare and Medicaid Services facilitates performance measurement and quality improvement through their voluntary reporting programs, such as the Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU) and Physician Quality Reporting Initiative (PQRI). CMS is also engaged in a pilot demonstration to standardize the assessment the quality and efficiency of care for post-acute care (PAC) settings. The pilot uses an electronic, standardized patient assessment instrument called the Continuity Assessment Record and Evaluation (CARE) tool. The benefit of the web-based technology is that it will allow for future modifications of the data sets it collects to reflect the latest evidence-based medicine. The CARE tool was informed by providers, health services and information technology experts and is intended to replace current Medicare assessment forms, including the OASIS, Minimum Data Set (MDS), and Inpatient Rehabilitation Facility Patient Assessment Instrument (IRFPAI) tools.⁷

Certification Commission for Healthcare Information Technology is a recognized certification body for EHRs that aims to accelerate the adoption of robust health IT by facilitating interoperability between EHRs, HIEs, and other entities; to make patient records portable; and to facilitate quality measurement and improvement. The CCHIT helps to drive standards compliance into health IT products, and to accelerate adoption of those products by providers through their certification process.⁸

Healthcare Information Technology Standards Panel was formed for the purpose of harmonizing and integrating standards that meet clinical needs for sharing information among organizations and systems. Specifically, HITSP works with standards development organizations to identify and/or harmonize Interoperability Specifications, suites of documents that define selected standards and provide implementation level guidance to satisfy the requirements imposed by a given AHIC Use Case.⁹ On January 21, 2009, the Secretary of HHS formally recognized three of these interoperability standards related to EHR, personal health records and electronic quality monitoring.¹⁰ These standards are now part of the mandatory requirements for federal agencies to adhere to when implementing health IT systems. In addition, HITSP standards are used as the basis for NHIN grantee pilot testing of the AHIC use cases. CCHIT also incorporates selected interoperability specifications into their own certification programming for commercial EHR products.

High-Value Health Care Project (HVHC), conducted by the Brookings Institution Engelberg Center for Health Care Reform, promotes widespread use of valid quality and cost measures to improve medical care and facilitate more informed decisions by patients. HVHC is funded by the Robert Wood Johnson Foundation. The HVHC also supports the Quality Alliance Steering Committee (QASC). Through the HVHC, the Brookings Institution is working with the QASC to identify the necessary steps to achieve the QASC's strategic plan, or "roadmap" to help drive the nation towards development of "nationally-consistent performance results." More specifically, the Brookings Institution is identifying methods to aggregate and integrate healthcare data, measure costs and efficiency of high priority clinical conditions, and to collect disparity data to improve care for all racial and ethnic groups.¹¹

Integrating the Healthcare Enterprise (IHE) coordinates the use, and drives the adoption of established standards such as Digital Imaging and Communications in Medicine (DICOM) and Health Level 7 (HL7) to address specific clinical needs. IHE intends to bring together health IT stakeholders to implement standards for efficient patient information exchange by creating an interoperability framework. In order to drive the adoption of standards, IHE developed Integration Profiles that detail how the standards are to be implemented and utilized to enhance interoperability.^{12,13}

National Committee on Vital and Health Statistics (NCVHS) serves as the statutory public advisory body to the Secretary of HHS in the areas of health data and statistics. NCVHS has implemented a subcommittee on quality to better understand the emerging data needs for measuring and tracking population health. In an effort to provide recommendations, NCVHS plans to determine the applicability, use and limitations of health IT tools as methods for capturing population health information. They will also assess current and proposed certification standards for taxonomy, standards and privacy and security concerns for health IT.¹⁴

National eHealth Collaborative (NeHC), previously known as the successor to the AHIC, will continue the work of the AHIC, specifically the prioritization of areas to develop interoperability standards for health IT. In addition, it is anticipated that the NeHC will also lead the creation and promote the use of secure interoperable nationwide health information systems to advance the public's interest in health and the quality, safety, efficiency and accessibility of healthcare information.¹⁵

Quality Collaboratives that comprise experts across the healthcare industry have come together to help improve specific aspects of healthcare delivery including quality measurement and reporting. The Hospital Quality Alliance (HQA) brings together hospital groups, consumer organizations, provider groups, oversight organizations, government representatives and employer groups to collaborate on how to make information about hospital performance available to consumers as well as providers in order to improve care. The Ambulatory Care Quality Alliance, a similar consensus-based effort related to physician performance, renamed itself the AQA after expanding its scope to encompass all aspects of physician care. Both alliances seek to create an aligned, orderly and strategic approach to performance measurement through recommending measures for national adoption.

Two additional examples relevant to the HITEP's charge are the Alliance for Pediatric Quality and the Collaborative for Performance Measure Integration with EHR Systems (Collaborative).

The Alliance for Pediatric Quality supported the Quality Reporting Document Architecture (QRDA), which is focused on developing electronic data standards for exchange of patient-level quality measurement data between healthcare information systems. The initiative mapped selected existing measures to the HL7 Clinical Document Architecture (CDA) which is an open data standard that can be implemented in centralized and distributed systems irrespective of underlying application, communications platform, or architecture. The QRDA will improve the ability to report based directly on clinical findings as well as on administrative data for current and emerging measures. The Alliance has identified next steps for consideration, including specification and profile development, pilot implementation and testing, and communication, education, and coordination.¹⁶

The Collaborative is co-sponsored by the American Medical Association (AMA), Electronic Health Record Association (ERHA) and the National Committee for Quality Assurance (NCQA). The Collaborative was formed to improve the accurate translation of measures and to promote quality through the integration of performance measures into EHR systems. The Collaborative recently developed a prototype XML format using standardized language, thus allowing more consistent EHR measure specifications for EHR systems vendors to incorporate standards for measurement-related data within their products. The XML schemas focused on the Physician Consortium for Performance Improvement (PCPI) and NCQA measures. Further testing of these schemas will be conducted in 2009.¹⁷

2. IMPLEMENTING ORGANIZATIONS

Despite insufficient standards, interoperability requirements and policies to help structure and facilitate exchange of information for quality measurement and improvement purposes, there are leaders in the field of quality measurement who are collecting electronic clinical data and/or a combination of electronic and manually-collected clinical data for quality improvement purposes.

Better Quality Information to Improve Care for Medicare Beneficiaries Pilots were launched by the CMS in six communities. The BQIs tested methods to aggregate Medicare claims data with data from commercial health plans and, in some cases, clinical data, in order to calculate and report quality measures for physician groups. The six communities implemented different processes to aggregate data for performance measurement reporting. The results from the project will be used to guide future efforts for aggregating Medicare claims data with data from other payers to produce quality measure results that provide a more comprehensive picture of the quality of services being provided to Medicare beneficiaries. The BQI pilot concluded in 2008,¹⁸ although many of the BQI organizations continue to serve health information exchange functions within their communities.

Health Information Exchange (HIE) initiatives are building relationships, infrastructure and capacity to move clinical information electronically between disparate healthcare information systems. HIEs serve to facilitate access to and retrieval of clinical data to provide safer, more timely, efficient, effective, equitable and patient-centered care. Formal organizations have emerged to support the HIE functions. These organizations, such as RHIOs, oversee health information exchange within a defined geographic area for participating stakeholders for the purpose of improving health and healthcare delivery

in that community. Additional organizations support this goal of the implementation and use of both health IT and health information exchange, including national organizations such as the Office of the National Coordinator within HHS, private-public partnerships such as Connecting Communities for Better Health Program conducted by the eHealth Initiative Foundation, and philanthropic initiatives such as the Markle Foundation's Connecting for Health initiative.¹⁹

National Health Information Network operates under oversight from the Office of the National Coordinator (ONC). The NHIN, currently in pilot phase, seeks to provide a secure, nationwide, interoperable health information infrastructure. Often referred to as a "network of networks," NHIN is intended to connect all healthcare stakeholders, allow the exchange of patient level information, facilitate clinical decision making, and support the delivery of appropriate, evidence-based medical care through a three-phased approach.²⁰ This approach includes:

- 1) Prototype architectures that fed the design and standards development processes related to the NHIN Trial Implementations (*completed*)²¹
- 2) Trial implementations which will operate as the NHIN Cooperative to implement and test the NHIN specifications and securely exchange patient data, including the 2007 Quality Use Case and demonstrate their connectivity to other networks (*in process*)²²
- 3) Production which will allow a phased approach to move the NHIN toward production (*scheduled to begin in 2009*).²³

Health Plans are uniquely positioned to promote quality because of their ability to collect, aggregate and report on claims data across the continuum of care and to influence their providers to augment claims data with clinical data by use of incentive-based programs. Health plans like Anthem BCBS who received the 2008 John M. Eisenberg Patient Safety and Quality Award for its Hospital Incentive Program and Quality Physician Performance Program are rewarding hospitals and physicians for practicing evidence-based medicine and implementing other nationally recognized best practices.²⁴

Healthcare Providers and Provider Organizations include individual physicians and clinicians as well as the provider practices, hospitals, and health systems in which they provide care. Together these groups are the focal point of most quality improvement efforts. Innovative and leading edge providers and provider organizations are leveraging their clinical data to drive internal quality improvements through health IT including measuring clinical trends, identifying gaps in care, and giving providers, researchers, and patients access to the collected information.

B. Current Landscape of Quality Measurement

Over the last 15 years, the healthcare industry has developed metrics to assess performance for three primary purposes: internal improvement, public reporting, and value-based reimbursement. The sources for these measures vary, and have changed over time. Initial quality measures relied heavily on administrative data from provider billing systems and payor claims systems. These data had the advantage of being readily available and standardized, and measures based on them could often be

calculated automatically with little if any human intervention. As quality measurement increasingly became a tool for benchmarking providers and even reimbursement, however, the imprecision of administrative data became a concern. Studies found that using ICD-9 billing codes to identify patient populations and specific interventions was significantly less accurate than relying on clinical data recorded during the care process.²⁵ Measures used for quality reporting began to shift towards using clinical data. While measures based on clinical data were more likely to be accepted by clinicians, extracting the necessary data elements presented additional issues. Precision—most frequently reflected in detailed exclusion criteria to define the measure denominators—translated into a heavy burden of manual chart abstraction. To date, EHRs have not made a significant dent in this burden. In recent years, there has even been a slight shift back to using administrative data: Eleven of the thirteen new inpatient hospital measures implemented by CMS for FY 2009, for example, use administrative data.

As the HITEP seeks to conceptualize a QDS for which interoperability standards should be prioritized, it will be useful to understand the measures that organizations are currently using, and how they are (or are not) using administrative sources as well as EHRs and other health IT tools to collect and report them.

The following section presents a discussion of which measure sets are being used, how organizations are altering widely-used measures to meet their measurement goals, and types of care organizations would like to measure but can not. As with other sections of this report, the information presented is intended to provide a window into what is happening in the real world environment, but because of the relatively small number of organizations interviewed, is not a scientific sample of the entire universe of organizations undertaking measurement activities.

1. CURRENT REPORTING REQUIREMENTS

Healthcare quality measurement in the United States began as a decentralized endeavor, with providers and payors developing their own measures for internal improvement and reporting purposes. In the 1990s, however, national healthcare organizations began to define the measurement landscape. In 1992, the NCQA took responsibility for the Healthcare Effectiveness Data and Information Set (HEDIS), an effort by employers and health plans to develop a common ambulatory care measure set for the managed care population. NCQA expanded HEDIS to accommodate additional measures and domains of care and in 1999 incorporated it into the NCQA managed care accreditation process. Today, NCQA accredits health plans and measures performance using a set of over 60 standards spanning across 40 conditions and areas of care. The majority of NCQA measures can be calculated solely from claims data, but a few widely used measures, such as the diabetes measures, require clinical values that are not available in claims.

A similar process occurred for the inpatient community. The Joint Commission, known at the time as The Joint Commission on Accreditation of Healthcare Organizations, released its ORYX program in the mid-1990s in an effort to incorporate objective measurement of care processes into the hospital accreditation process. Under the initial ORYX program, hospitals were required to demonstrate that they measured their care processes against an external reference database. In 2002, the JCAHO further standardized this initiative by establishing core measures in four clinical areas and requiring use of a subset of these measures as a prerequisite for accreditation. These

core measures, which were based on measures developed by CMS for use by its Quality Improvement Organization (QIO) program, have since expanded to include eight domains of care. The heavy reliance of these measures on clinical data translates into a high reliance on chart abstraction in order to calculate the measures.

Responding to dictates in the Medicare Modernization Act of 2003 to increase the transparency of healthcare, CMS further reinforced the use of the core measure set in 2004 when it tied reporting of a “starter” set of 10 core measures to receipt of a hospital’s full Medicare market basket update. This connection of quality reporting to payment in effect insured that virtually all acute care hospitals in the United States would report on a common measure set. Public reporting of hospital performance on CMS’ Hospital Compare website has served only to heighten the centrality of these measures, which now include 43 process and outcome measures as well as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAPHS) patient experience of care survey.²⁶

CMS has also initiated an ambulatory care quality reporting program. The PQRI, now entering its third year, offers incentive payments to providers (currently two percentage points) who report on quality measures for a minimum percentage of their patients. The 2009 PQRI consists of 153 quality measures and 7 measures groups²⁷. Participating providers can choose from a wide array of performance measures in primary and specialty care, some of which overlap with HEDIS and AQA measures. Reporting can occur via claims or, for some measures, via registries that CMS approves for this purpose. In addition, in 2009 CMS is piloting the use of EHR-based reporting for 11 measures.

Other national organizations have contributed measure sets that are widely used in the field. The Society of Thoracic Surgeons (STS) National Database, developed in the early 1990s, is now used by over 85% of cardiac surgeons nationwide²⁸ and the American College of Cardiology’s National Cardiovascular Data Registry (NCDR) offers standardized measures for both facility-based and office care. Submission to these registries is primarily a manual process that relies on chart abstraction.

New Directions in Measurement. The nationally-oriented initiatives highlighted above have offered evidence-based, tested process and outcome measures with high reliability and validity for particular sectors of the healthcare community. As attention shifts to the need to provide patient-centered care across care settings however, a new paradigm of measurement needs to be developed. Several nascent efforts to measure care across settings are worth noting. CMS’ CARE tool, described earlier, seeks to use a common tool with common measures across post-acute care settings to support continuity of care. NQF’s project “Measurement Framework: Evaluating Efficiency Across Patient-Focused Episodes of Care” has developed a conceptual model that can catalyze the development of measures across care settings.

As the number of available measure continues to multiply, and reporting mandates continue to increase, there is a concern that the costly and labor-intensive nature of current measurement activities is not sufficiently advancing the state of healthcare delivery in the United States. The National Priorities Partners, an initiative sponsored by NQF, seeks to define “high leverage” areas that, with the appropriate focused measurement resources are most likely to demonstrate improvements in care delivery. Through a collaborative process involving 28 national organizations, the National

Priorities Partners will work toward setting a consensus-based set of priority measurement areas for the nation.

2. USE OF MEASURES TODAY

The twenty organizations that Booz Allen interviewed present a useful snapshot of how provider groups, health plans, employer initiatives, and other collaborative groups are utilizing measures to achieve quality improvement goals. These organizations have taken advantage of the emergence of the widely-accepted, evidence-based process and outcomes measures for ambulatory care as well as inpatient and outpatient facility-based care that are discussed above. The publicly-reported measures contained within the HEDIS, AQA, HQA, Joint Commission, and CMS measure sets offer a ready-made set of tested measures that increasingly cover a large spectrum of care provided.

Measure sets used. Organizations interested in assessing inpatient performance used the measures under CMS' RHQDAPU program as the basis for their quality reporting and improvement activities. As one health plan stated, "we use what hospitals already report on." Several non-provider organizations with easy access to claims data supplemented these measures with claims-based reporting (e.g., CABG mortality; AHRQ Patient Safety Indicators).

Interviewees focused on ambulatory care similarly relied on the widely-used AQA and/or HEDIS measures, but were more likely to report that they "tweaked" the measures to suit internal needs. For example, one collaborative and former BQI site created composite measures on diabetes, ischemic heart disease, and vascular disease, relying on HEDIS measures for the child measures. Another collaborative, in an effort to make the measures more acceptable to providers, refined the denominators of HEDIS/AQA measures to ensure the population was more narrowly focused on a provider's "current" pool of patients. The IHS altered denominators to narrow the measures to particular age ranges or gender to better focus their internal reporting on specific populations. A health plan changed the timing of data collection of HEDIS diabetes measures, preferring to measure concurrently rather than retrospectively.

A few organizations created their own "home-grown" measures. For example, two inpatient provider organizations reported developing measures for internal improvement that focused on particular "hot button" issues such as safety and door-to-drug times for which no existing measures were suitable. The IHS has created their own measures to meet several different government reporting requirements for federally-sponsored health care programs. When widely-used measures that mapped to IHS goals required chart abstraction or simply were not available, they developed alternative measures that could be collected via the fields available in Resource and Patient Management System (RPMS), their EHR. A statewide-collaborative created its own depression measures that capture data longitudinally from point of onset through the first year of treatment, to see if patients improve over a baseline PHQ-9 score.

Data Types/Categories Used. HITEP 1 defined data categories and types necessary to measure a priority set of HQA and AQA measures. Booz Allen sought to determine through its interviews and through examining supplemental data provided by some respondents how the data being collected by the twenty interviewees compared to the common data categories and types in the HITEP I Report. Since the organizations interviewed by Booz Allen used the same HQA and AQA measures that the HITEP had

initially prioritized, it was not surprising that the categories and types of data they reported using in quality measurement activities tied closely to the list in the first HITEP report. Whether the interviewee was part of provider organization with direct access to many of the data types necessary to calculate quality measures, or a collaborative that had to obtain data from providers, payors, and other sources, the respondents reported using the same types of data. Diagnosis, diagnostic study (order and result), medication order and order filled, procedure, and vital signs (i.e. blood pressure) were frequently used. The organizations also collected data on the providers and payors, date of service, and patient demographic information. The measure specifications and data dictionaries supplied by some of the interviewees and provided to NQF as a supplement to this report offer more detailed information on measure types as well as which standardized codes are used to capture them.

3. MEASUREMENT GAPS

Stakeholders interviewed were also asked whether there were aspects of clinical care they would like to measure but were unable to measure. In their responses, the interviewees listed not only domains they would like to measure, but types of data they would like to collect but could not currently access.

The most frequently-mentioned domains for which the respondents would like to measure performance were specialty care and continuity of care across settings, especially post-discharge. Both collaboratives and providers expressed interest in measuring each of these areas. Reasons that specialty care was not currently being measured included cost, and limited availability both of the data and of adequate measures. Similarly, the lack of existing measures of care coordination/ transitions across settings was a barrier to measurement in that area. Another related area respondents indicated they would like to measure but were currently unable to do so were episodes of care. The desire to conduct longitudinal assessments was mentioned several times by respondents.

Other areas cited by more than one respondent included measuring efficiency (e.g., patient flow), mentioned by three inpatient providers; and pediatric care. Several interviewees said they would like to delve more deeply into issues around disparities in care, but were hampered by a lack of racial and ethnic data. Behavioral health, cancer staging, obesity, hypertension, and filled prescriptions were also mentioned.

Certain barriers to measurement were mentioned more frequently by particular types of interviewees. Collaboratives, which almost exclusively rely on other organizations to provide data to them, often cited cost as a barrier to additional measurement. For example, one collaborative that wished to measure specialty care noted that some of the data they would need to measure was currently available via registries, but that the specialty societies charged too much for access to the information. Another mentioned the same barrier for lab data—while hospitals that were part of the collaborative provided their in-house lab data to the collaborative, the collaborative needed to pay for access to reference lab data. A third collaborative mentioned cost in general as a barrier to all the areas this organization would like to measure. In contrast, cost was less frequently mentioned as a barrier by provider organizations, which were more apt to cite the lack of adequate measures as a reason they were not conducting certain measurement activities.

The absence of an available electronic record of a transaction was another barrier mentioned. Three examples were provided: patients paying cash for generic drugs rather than using their prescription plans, patients taking over the counter medications, and patients receiving care at employer-based clinics. In all situations, no claim is filed and no other electronic record is available, making it difficult to collect data about what occurred during the transaction.

C. Current Approaches for Quality Measurement and Improvement

Current efforts to collect data for quality measurement and improvement purposes follow a common process that typically includes the following key activities: data collection, aggregation and measure calculation, and audit and validation of results. However, the use of health IT as a data source for quality measurement and improvement initiatives has introduced critical points of variation in how these activities are carried out. In addition, differences in the organizational constructs used to exchange health information for quality measurement and improvement purposes also result in variation in how these activities are conducted. Understanding the current approaches to quality measurement and improvement along with the challenges faced in carrying out these activities will provide useful context to the HITEP as they deliberate on how to conceptualize the QDS.

The following section presents an overview of the quality measurement and reporting activities described by interviewed stakeholders, including a discussion of the impact the quality measurement and reporting process and health IT have on clinical workflow. In addition, it describes the input received from interviewees regarding the exchange of clinical information among providers and across care settings to facilitate continuity of care, when such exchange occurs. Finally, a summary of the challenges associated with use of electronic clinical data for quality improvement as articulated by the interviewed stakeholders is also provided. As noted previously, findings should not be considered representative of the universe of organizations undertaking measurement. They do, however, provide useful insight into the issues being faced by stakeholders involved in measurement activities that use electronic data.

1. OVERVIEW OF THE QUALITY MEASUREMENT AND IMPROVEMENT PROCESS

Data Collection. The sources of clinical data (e.g., EHR, paper chart, other clinical health IT system) used to inform quality measures varied depending on the infrastructure and resources available to the interviewed organizations. Data sources for the measures collected by the providers interviewed included information from internal administrative and financial systems, paper charts/medical records, EHRs, and other clinical health IT systems. In some cases, data from laboratory systems, pharmacy systems, and radiology result were integrated with the provider organization's health IT systems. This integration usually occurred in the large health systems and integrated delivery systems where such services are part of the organization. In situations in which the laboratories were independent entities, data were sometimes sent to the provider in paper or electronic format but were not necessarily integrated into their health IT systems. Whether or not data are sent to the provider in these cases depended on the data sharing arrangements in place between the provider and the external entity. For collaboratives, data collection was dictated by the partnerships in place with local organizations, to include hospitals, providers, health plans, and in a few cases, local laboratories and pharmacies.

While infrastructure and resources dictated which data sources are used to support care delivery and quality measurement, the nature of the measures themselves also influenced data sources used and data collection processes. For example, all providers/integrated systems interviewed that included inpatient facilities submitted data for the CMS RHQDAPU program. By necessity, these measures require manual data collection. As several provider organizations interviewed pointed out, it is impossible to collect via EHRs all the data necessary to populate CMS' RHQDAPU measures. Even interviewees that had developed their own EHRs could not achieve 100% electronic collection. They were able to populate between 70% and 85% of the RHQDAPU measure data automatically, but still had to supplement the electronic data with data obtained through manual chart abstraction. One organization cited the specific timing requirements inherent to the RHQDAPU measures as the kind of data element that could not be collected electronically. An example of ambulatory measures dictating which data sources were used was raised by an integrated health system that reported on childhood immunizations and lead exposure assessments. In both cases, the system had to integrate administrative data from statewide registries with its internal EHR data in order to report on these measures.

There were also instances in which providers did not rely solely on electronic data because they felt clinical judgment was necessary. An example raised was blood stream infections. Even though electronic data might indicate that an infection was present, there still needed to be clinician review to determine the cause of the positive culture.

Finally, there were also business reasons providers could not rely solely on EHRs as sources for quality measurement. While most of the providers reported having some lab data integrated into their EHR, and several also had integrated radiology or pharmacy information, they at times had to incorporate ancillary data from a provider that did not integrate with their system. For example, one small provider interviewed was part of a larger physician group that used a common EHR, but the local hospital where they admitted most of their patients was not part of their integrated system. All relevant information from this hospital was scanned into their EHR and had to be extracted manually for quality improvement and reporting purposes.

Aggregation and Measure Calculation. The majority of interviewed stakeholders who took part in data aggregation and measure calculation activities indicated that even with the use of electronic data, significant manual effort was required to ensure data were aggregated and measures were calculated properly. Mapping electronic health IT system data fields to quality measures is an important part of this process and one that happened with varying degrees of sophistication across the interviewed stakeholders. One collaborative respondent indicated that they provided measure specifications to their providers and then actively worked with them to ensure they were using the appropriate fields from which to pull data to inform their quality measures. They noted that the process wasn't formalized and they did not have documentation of their system to measures mapping, but that they utilized a dedicated staff person to review the submitted data and work with their provider organizations to ensure the data that was submitted was appropriate for the measure. Another collaborative indicated they had developed detailed data maps and worked with their providers to ensure they were followed.

For multi-stakeholder collaboratives, aggregation was a particular challenge because the providers submitting data were not all using the same vendor products for their clinical health IT systems. Ensuring that all provider organizations were submitting appropriate data and that the data could be aggregated across these organizations required significant effort. Two collaboratives used a vendor to perform this service and indicated that the vendor had developed very detailed data maps that allowed them to perform this activity. Two other collaboratives dealt with this issue by asking participating provider organizations to submit data via an online portal. While this method helped with data standardization, it also required manual data entry to submit the data on the part of the providers. Two collaboratives indicated that they also accepted paper-based data faxed by providers who lacked clinical health IT systems or who lacked the resources to extract the data from their clinical health IT systems, which added to the complexity and level of effort required to aggregate the data. Only one collaborative indicated they had succeeded in collecting all the necessary data from EHRs, were able to automatically extract the data and enter it into their clinical data repository. This collaborative followed a deliberate strategy of standardizing the EHRs used in the communities it serviced, and then working with the EHR vendors to customize the tools to meet reporting needs. A few collaboratives also collected data from health plans and/or laboratories in the communities they served. While the data collected from health plans were claims data, collaboratives faced significant challenges with ensuring that patients, providers, and facilities were matched appropriately.

For aggregation that occurred within large health systems or integrated delivery systems, aggregation of data to calculate measures was less burdensome primarily due to the fact that a common technology platform was used across facilities and data were simply being submitted to a parent organization.

Audit and validation of results. A critical step in calculating measures was auditing the data. Interviewed stakeholders indicated that audit processes were used to ensure data accuracy, to ensure completeness of data, and to ensure numerator and denominator calculations were accurate. Even with the use of electronic data, this step was necessary due to the complexity of measure specifications. Audit and validation were burdensome and time consuming for the interviewees since it is largely a manual process.

2. QUALITY MEASUREMENT AND CLINICAL WORKFLOW

The impact of quality measurement and reporting activities on provider institutions and, more specifically, on clinical workflow is an issue of concern for the healthcare industry. Research indicates that the administrative burden on hospitals and providers to report on quality metrics is significant and continues to grow as reporting requirements and quality improvement initiatives expand.

EHRs and other clinical health IT systems have helped reduce the burden of clinical data collection on nursing and support staff and have also helped to eliminate redundancies in data collection tasks.²⁹ However, studies have also shown that even where EHRs have been implemented, some degree of manual chart review is still necessary to ensure accurate quality reporting.³⁰ These findings were echoed by the stakeholders interviewed as part of the environmental scan, who indicated manual chart reviews and/or detailed review or audit of submitted data were needed to ensure appropriate

calculation of the numerator and denominator for quality measures and to ensure that exclusion criteria were properly taken into account.

While it has been widely recognized that implementation of an EHR can have positive impact on the efficiency with which clinical workflow is conducted,³¹ both anecdotal evidence from the interviews and literature suggest that EHRs and other health IT systems are not developed with quality reporting requirements in mind.³² Typical problems include difficulty in identifying the best methods to record needed data through the EHR and variations recording practices across providers.³³ Interviewed stakeholders cited both of these as major issues when considering clinical workflow within their own organizations. These issues, in turn, lead to the need for the manual review discussed above to support quality measurement. Some interviewed organizations indicated that they relied on vendors to provide data extraction services. Others have worked with their vendors to establish quality measurement and reporting modules that sit on top of their EHRs. Providers indicated that ability to query the EHR using variables of interest to them was a much needed feature that would greatly facilitate quality measurement and reporting initiatives.

Training, user preferences, support from organizational leaders, and the extent to which clinical workflow was taken into account when planning the integration of the EHR into routine use are all seen as critical variables to successful EHR implementation.³⁴ However, all but two of the interviewed provider organizations indicated they do not have formal clinical workflow documentation, even though many articulated the importance of workflow assessment in implementing their own EHRs. Two large health systems indicated that they were beginning to develop clinical workflows for their system because they realize the inherent value of the workflows, though no substantial progress had been made to share with the HITEP.

3. HEALTH INFORMATION EXCHANGE TO FACILITATE CARE COORDINATION

The ONC defines health information exchange as “the electronic movement of health-related information among organizations according to nationally recognized standards.” ONC goes on to describe health information exchange as supporting several primary functions including quality improvement and facilitation of coordinated care.³⁵

All of the stakeholders interviewed indicated they are exchanging clinical data electronically to support the collection and reporting of quality measures and use of that information to inform organizationally-driven improvement efforts. However, only a subset of the interviewed stakeholders are exchanging clinical health information to facilitate care coordination. Those stakeholders that are exchanging data for this purpose have one key factor in common: the use of a common interoperable technology platform that allows providers across facilities and care settings to access patient data.

A common technology platform typically means that the exchange of health information happens under the umbrella of a common parent organization, such as within a large integrated delivery system or health system. Interviewed stakeholders that represented such organizations indicated that electronic information sharing was limited to those facilities that were part of their network. However, being part of this type of organizational entity does not guarantee that a common technology platform exists. For instance, one health system indicated they are still working to migrate some of their facilities from existing legacy systems to their chosen administrative and clinical health

IT systems. In addition, due to the incremental nature of EHR implementation across their network of providers and institutions, different facilities are using one of two different EHR products. The health system was able to address this limitation by creating an interface between the two EHR systems that allows data sharing between them. Another large health system indicated that health information exchange across their network of facilities still occurs via telephone call, fax, or sharing of paper documentation because of their use of different clinical health IT systems that are not interoperable. This health system did indicate that they are working towards implementing a common EHR technology across their network of facilities.

When a common technology is in place to allow health information exchange to facilitate continuity of care, interviewed stakeholders indicated that providers have access to clinically relevant information related to patients under their care, including common allergy lists, medication lists, and problem lists. However, interviewees also indicated that reconciliation and review processes required an active effort on the part of physicians to review these lists.

The multi-stakeholder collaboratives that were interviewed as part of the environmental scan typically did not facilitate data sharing across their provider institutions. Instead they provided reports back to the providers that were part of their collaborative on their performance.

4. CHALLENGES

As part of the interview process, stakeholders were asked to describe the challenges faced in capturing and/or aggregating standardized clinical data through EHRs or other clinical health IT systems to support their quality measurement and improvement activities. The answers spanned multiple areas and have been grouped to describe technical challenges (e.g., lack of standards, measure specifications, etc.), policy challenges (e.g., privacy and security), and business-related challenges (e.g., costs, resources, etc.). A summary of these challenges is presented below. Further discussion of these issues as they relate to recommendations made by the interviewed organizations is presented in Section IV.

Technical Challenges. The technical challenges identified by interviewees spanned limitations in quality measures that impacted their ability to populate metrics using EHR data to deficiencies within EHR and clinical health IT systems themselves. The overarching impact of these issues was an increase in the manual burden to report on quality measures and limitations on the quality assessments that could be made. Understanding these challenges can provide the HITEP with useful insights regarding hurdles that must be overcome related to health information exchange and quality measurement and improvement using clinical electronic data.

Technical Challenges

- Measure specifications are not structured in a way that they can be easily translated into electronic reporting requirements.
- Identifying inclusions, exclusions, and constructing measure numerators and denominators when using EHR data is difficult. For example:
 - Considerable manual effort is required to ensure adherence to complex and changing exclusion criteria because EHRs are not structured to capture exclusion criteria the way that measures specify them.
 - EHRs typically do not record time of data collection, thus making it difficult to report on measures that include a timing component.
- Lack of structured fields make it difficult to capture important patient data including surgical and medical history.
- Incomplete data complicates verification that measures are accurately reflecting performance. It is difficult for collaboratives in particular, to know if they are receiving complete data from all participating provider groups. Collaboratives also often lack important administrative data on certain segments of their community's population. *(Also noted as a business challenge.)
- Inability to consistently and accurately identify patients and to match patients to providers limits ability to support care across care settings and to assess episodes. * (Also noted as a policy issue.)
- Disparate clinical health IT systems (and in some cases manual charts) cause challenges for data aggregation due to differences in EHR architecture and how data are structured.
- Inability to map lab data from private laboratory companies to quality measures due to their use of proprietary code sets and lack of enforceable content standards for lab data limits the ability to use lab data in quality measurement and improvement initiatives.
- Difficulty in querying and extracting data from EHRs using variables that could be used for quality improvement limits ability to measure quality, analyze information, and make improvements in care delivery
- Lag between care delivery and quality / performance reporting due to the time required to collect data, develop measures, audit the data, and develop reports is significant and can reduce the ability to act on the performance reports in a meaningful way.

Policy Challenges. The policy challenges identified by interviewees described barriers to both to quality measurement and health information exchange using EHRs that transcended the fields of quality measurement and health IT. While these barriers may not be within the scope of the HITEP to address, they provide useful context regarding what implementing organizations face today.

Policy Challenges

- Low EHR adoption in some communities necessitates continued reliance on claims driven quality measures and also complicates the ability to develop aggregate metrics using clinical data.
- Privacy and security issues impede information exchange across organizational boundaries.
- Inability to consistently and accurately identify patients and to match patients to providers limits ability to support care across care settings and to assess episodes. *(Also noted as a technical issue.)

Business-Related Challenges. The business-related challenges articulated by the interviewees focus primarily on the burden and costs of quality reporting. In addition, the inability to access and utilize information across organizational boundaries was another theme that emerged from the articulated challenges. Similar to the policy challenges just described, while these barriers may not be within the scope of the HITEP to address, they provide useful context regarding the issues that interoperable health IT and standardization of electronic clinical data can help to address.

Business-Related Challenges

- Manual burden of data collection for quality measurement, even with the use of EHRs (e.g., use of structured data fields as opposed to free text data fields), can be a drain on resources and reduce clinical staff ability to spend time on care delivery and requires an assessment of the tradeoff between improved ability to analyze clinical data and reductions in clinical workflow efficiency.
- Inability to exchange data across care settings limits access to the most up-to-date and accurate information about a patient, thereby restricting the ability to deliver optimal care. Stakeholders specifically referenced the lack of information about care received in non-integrated facilities as a challenge.
- Substantial costs associated with modifications to health IT systems and with utilizing vendors to extract data and assist with data collection, aggregation, and measure calculation limit some organizations' ability to participate in multiple quality initiatives.
- Increased costs associated with accessing lab data from private laboratory companies hampers the ability to include lab data in quality measurement
- Incomplete data makes it difficult to report on quality measures and to ensure measures are accurately reflecting performance. Collaboratives in particular, find it is difficult to know if they are receiving complete data from all participating provider groups. They may also lack important administrative data on certain segments of the community population. *(Also noted as a technical challenge.)
- Limited resources to support quality measurement and improvement hinder ability to pursue quality measurement initiatives that could help improve care delivery. Specifically referenced limitations include:
 - Burden of manual chart review / analysis and audit / validation to ensure correct measure construction and to take into account complex exclusion and inclusion criteria.
 - Burden of constructing measures using aggregated data across organizations, which requires complex data mapping.

IV. Recommendations to HITEP Priorities for Structured Clinical Data

Organizations that are currently collecting and exchanging data to measure performance have unique insights into the kinds of changes that could be made to measures, tools, and the overall infrastructure in order to improve the quality measurement enterprise. As part of our interviews with stakeholders, Booz Allen asked what data categories, types, or elements respondents would prioritize for better standardization to improve their ability to measure and improve quality. In addition, Booz Allen asked for their recommendations on how health IT could be enhanced as a data source to support quality measurement and improvement. The recommendations provided can directly inform HITEP's efforts to conceptualize a QDS for which interoperability standards should be prioritized. In addition, these recommendations can help the HITEP better understand changes that need to be made in the overall quality measurement environment to support automated quality measurement and reporting.

Not surprisingly, the interviewees' responses reflected the challenges and gaps described in the previous section, as well as the interviewees' enumeration of areas they would like to measure but are not currently able to measure. Their recommendations have been categorized below into technical recommendations (e.g., standards for lab values), policy recommendations (e.g., privacy and security issues) and business recommendations (e.g., to promote investment in interoperable EHRs). To facilitate review of this information, the responses have been *ordered* within each of these categories according to the number of times they were recommended by the interviewed organizations.

1. TECHNICAL RECOMMENDATIONS

The technical recommendations received from the interviewed stakeholders crossed many different topic areas. To facilitate NQF and HITEP's review, the responses have been grouped into two categories:

- ▶ Recommendations for areas in which standardized data elements (for values and/or interoperability) are needed to support information exchange for quality measurement and continuity of care. Many of the providers described specific categories of data that should be better standardized. Others described clinical domains or care settings that should be better standardized or for which standardized measures needed to be created.
- ▶ Recommendations for enhancements to EHR functionality to better support information exchange for quality measurement and continuity of care.

Technical Recommendations

Standards to Support Quality Measurement and Continuity of Care

Standardization of specific categories of data

- Lab data, including lab orders and lab results
- Medications / prescription data, including standardized nomenclature, and information on both prescriptions and fills
- Patient medical and surgical history
- Immunization data
- Diagnostic test data
- Allergy data
- Co-morbidities
- Contraindications
- Information on functional status

Specific domain or clinical care settings that require standardization

- Specialty care*
- Continuity of care*
- Episodes of care* / longitudinal assessment
- Chronic care conditions
- Patient satisfaction *
- Disparity assessment (e.g., race, ethnicity) *
- Preventative services
- Pediatric Care
- Behavioral health
- Clinical Decision Support
- Areas prioritized by the NQF National Priorities Partners Initiative

* Denotes areas for which the interviewed stakeholder indicated that measures also need to be created.

Standardization of specific categories of data. Interviewed stakeholders recommended that several data categories should be standardized, both to expand the types of data available electronically to conduct quality assessment as well as to improve the quality of that data. In many cases, identifying interoperability standards and standards for values will also help to reduce the manual analysis that goes into identifying measure inclusions and exclusions.

The majority of interviewees cited the need for standardization of laboratory and medication/prescription data. For example, one collaborative reported that a laboratory responsible for approximately 50% of their patient population used proprietary codes for their lab data. As the interviewee noted “because there is no requirement for labs to use Logical Observation Identifiers Names and Codes (LOINC), they don’t.” Another collaborative cited the difficulty in standardizing the laboratory data because it is “such a decentralized industry.” The need for standards related to medication nomenclature was referenced several times by interviewees despite the existence of the National Drug Code (NDC), which was described as “over-specific” by one interviewed stakeholder and not necessarily usable for quality assessment purposes.

Five organizations mentioned the need to standardize data capture for medical and surgical history, in order to get a more comprehensive view of the patient. One of the organizations cited the example of a patient fall. Knowing that a patient had a fall in the past would be a crucial piece of information for a clinician, yet that fact would not be captured in most EHRs if it were not the reason for the patient's visit.

In an effort to support continuity of care, immunizations, prescriptions, diagnostic tests and their respective values, and allergies and contraindications were also mentioned by interviewees as areas that required further standardization.

Specific domain or clinical care settings that require standardization. Interviewed stakeholders cited several domain areas and clinical care settings for which standardization could facilitate quality assessment. In some cases, noted by an asterisk in the table above, the stakeholders also referenced the need for standardized measures in these same areas.

Standardization of data to support assessment of disparities in care was recommended twice by organizations that wanted to look at trended data to determine whether different care regimens would benefit patients of specific races or ethnicities. In addition, one organization recommended that the HITEP begin their efforts by focusing on the measurement areas defined by the NQF Priority Partners initiative.

Technical Recommendations
Enhancements to Existing EHRs
<ul style="list-style-type: none">• Standardized data capture• Automated exclusion criteria assessment and numerator / denominator calculation• Patient identifier• Algorithms to match patients with their providers• Timestamps• Clinical decision support• Expanded query capabilities• Data export/extraction

Interviewed stakeholders made several recommendations regarding enhancements to EHRs that could facilitate use of information for quality measurement and reporting and to facilitate continuity of care. These recommendations encompassed both standardization of data capture as well as additional or expanded functionality.

Standardization of data capture was an issue raised by many stakeholders. Many interviewees were frustrated with trying to extract specific information from unstructured narrative, such as patient histories or progress notes. Four interviewed stakeholders specifically recommended the use of structured data fields for areas such as medical/surgical histories. Of course, the existence of structured data fields alone was not always a guarantee that providers would use them. One interviewee pointed out the importance of integrating data collection into clinical workflow so that the use of structured data fields was less of a burden to providers.

One provider took the issue of standardizing data capture a step further and recommended development of a framework for data collection that would cover both data capture as well as standards related to the values and nomenclature (discussed in *Standards to Support Quality Measurement and Continuity of Care* above) used to document information in the EHR.

As referenced above in the section *Standards to Support Quality Measurement and Continuity of Care*, interviewed stakeholders recommended several categories of data for which interoperability standards and standards for values would help to reduce the manual burden of assessing inclusions and exclusions to construct measure numerators and denominators. Related to these recommendations, several stakeholders also recommended standardization of the mechanisms for capturing data within an EHR for inclusion and exclusion criteria. One organization gave the following example regarding the capturing data regarding smoking status: “If you ask the patients if they smoke and the patient quit six months ago, the patient will reply no. If you ask if the patient smoked in the past year, they will respond yes.” These two different questions would elicit different responses from the same patient, which would in turn impact the denominator of related measures (such as the RHQDAPU measures requiring smoking cessation counseling) and result in inaccurate reporting. Standardizing how fields are constructed and displayed within an EHR will improve the ability to correctly establish numerators and denominators for quality measures.

In addition, two additional interviewees specifically recommended that EHRs add in functionality to enable automated assessment of inclusion and exclusion criteria. These two organizations cited the need to reduce manual burden on staff to manually review the data.

The majority of interviews identified the need for a unique patient identifier that could be used across EHR systems and several recommended establishment of such an identifier. Two providers made this recommendation specifically in relation to facilitating data aggregation and to support longitudinal quality measurement and improvement, which also requires the ability to do patient-provider record matching. Four collaboratives who made this recommendation cited the need to enable patient and provider record matching to track physician-level performance as well as to facilitate continuity of care. One collaborative provided several examples as to how a patient identifier would be useful in different settings to facilitate improved care delivery:

- ▶ **Breast Cancer Screening:** A patient may have an exclusion in her history that would require the universal patient identifier in order to track the procedure (mastectomy, bilateral or unilateral)
- ▶ **Colorectal Cancer Screening:** A patient may have an exclusion in his/her history that would require the universal patient identifier in order to track the procedure (total colectomy). Also, the colorectal cancer screening measures often require a historical view into a patient's history to collect information on flexible sigmoidoscopy, colonoscopy, even double contrast barium enema.
- ▶ **Diabetes Eye Exam:** If a patient seeks care from an outside source, a Walmart or other non-healthcare institution for example, aggregation of data would require a universal patient identifier in order to record that a patient has had the required service.

- ▶ **Pharmacy Data Dependent Measures:** If a measure would require a prescription fill, a universal patient identifier to follow the data back from the pharmacy claim to the provider would be necessary.

Building on the need for a universal patient identifier, four collaboratives recommended having the capability to match patients with their providers through the development of algorithms. Identifying and using such algorithms in conjunction with a universal identifier or even an organizational level identifier would facilitate the ability to track patients across the continuum of care and measure performance longitudinally.

Two interviewees recommended that EHR functionality should be expanded to include a record of “when” in time important events, such as procedures, tests, and other aspects of medical and surgical history, occurred. One interviewee noted that the lack of a “time stamp” limits their ability to report electronically on HospitalCompare quality measures that have a timing component. Another provider noted that time stamp could help ensure the most up to date information regarding a patient is captured within the EHR. It could also help to prompt providers to ask for information if the record is out of date.

Several organizations recommended that standardized clinical decision support functionality needed to be embedded into EHRs to support care delivery. Clinical decision support holds the promise of facilitating consistent delivery of evidence-based care but could also help to facilitate quality assessment as well. Four interviewees recommended the addition of prompts to ensure information related to measure inclusion and exclusion criteria were collected only when it was appropriate to do so. Development of such functionality builds on the concept of automated inclusion and exclusion criteria referenced above.

Several stakeholders recommended that better querying and extraction functionality be developed within EHRs to allow EHR users themselves to extract data at both the patient and population levels. They specifically noted that it was important to query all of the data available within the EHR using data elements/variables of interest, not just those used for quality measurement.

2. POLICY RECOMMENDATIONS

Policy Recommendations

- Need better methodology to match patients and providers
- Need a common patient identifier that can be used across settings
- Need to address privacy and security issues to facilitate information sharing

Each of the recommendations grouped under the heading of “policy recommendations” has both a technical and a policy component. They have been included here to reflect the fact that technical solutions alone will not resolve the issues they are raising – each has a strong policy component that must be addressed.

Several interviewed organizations referenced the issue of patient and provider matching record matching and recommended it as an area for which improved methods were needed. One stakeholder specifically suggested a national patient identifier to track patients. This stakeholder referenced the benefits such an identifier could make,

including facilitating the ability to track patients across the continuum of care, develop episode of care groupings, and track costs and outcomes over time.

Another stakeholder referenced the need to address the “delicate balance” between sharing information and protecting patient privacy and recommended this issue as a critical area for which controls needed to be established, especially as we move into an future with increased health information exchange.

3. BUSINESS-RELATED RECOMMENDATIONS

Business-Related Recommendations

- Need for the measure developers to create better defined specifications that can be used with clinical health IT systems
- Need for more flexible EHRs that can be easily modified or open source health IT software
- Need to establish a measure release cycle

Five interviewees cited the need for clearer, better-defined measure specifications. They cited the complexity of exclusion criteria and denominator calculations as being too difficult to code into their systems. One hospital system stated that to calculate the denominator of “any process measure, the inclusion, exclusion and population definition specifications are often so complicated that it still requires manual clinical judgment to make a determination. Clearer, standardized specifications that can be translated to clinical health IT requirements will facilitate more accurate reporting as the risk of misinterpretation and inaccurate documentation decreases, and will also decrease the burden on the providers to collect data and calculate measures.

Not only are the measure specifications complex, they also change frequently, creating additional problems for organizations attempting to develop quality measures electronically. As one interviewee noted, “what gets included and excluded is complex and keeps changing”. A few providers highlighted the costs associated with requesting modifications to their EHRs and health IT systems to better support quality measurement, especially in the face of continually evolving measure specifications and reporting requirements. One stakeholder referenced the costliness of an add-on module to support quality measurement and reporting and noted that it was not a luxury all provider organizations could afford to purchase. Others referenced the level of effort associated with building the programming to extract data from their EHRs and analyze that data. Stakeholders that opted to have a vendor perform such activities also incurred additional expenses as specifications and/or reporting requirements evolved. One stakeholder made the recommendation that the industry needed to move towards use of open source software to facilitate the ease with which providers could make modifications and improvements to their EHRs.

Another interviewee recommended that a regular measure specification modification / measure release cycle would be welcome. Defined release dates would allow vendors to establish their own regular cycles for making upgrades to their EHRs. Establishing such a cycle would also help to minimize disruption to care delivery due to continuous EHR maintenance and upgrades as well as form changes in clinical documentation requirements.

V. Conclusion

Performance measurement is an important element of improving the quality of care provided in the United States. At the present time, however, measurement poses a significant burden in data collection, measure calculation, and reporting for the organizations involved. Required data elements are not uniformly available electronically, methods of capturing information may not have the precision necessary to define conditions accurately, and measure specifications and reporting requirements change frequently, all leading to extensive manual effort and/or cost outlays in order to measure quality. As this report has documented, organizations forego measuring certain aspects of performance because the burden of doing so is too great.

The current HITEP is poised to make a significant contribution to easing this measurement burden through developing a common quality measurement data set that could be collected electronically. This environmental scan can help the HITEP understand the real-world environment in which providers and collaboratives are operating today, including the often very basic challenges they face, the pressing needs that they have, and their perspective on how quality measurement can be enhanced electronically to improve the delivery of care. Participants in the this study were passionate about the ways that measurement can directly improve care delivery, and their insights can inform the HITEP as it embarks upon its creation of the QDS.

Appendix A: Interviewed Stakeholders

Collaboratives

- ▶ Anthem Blue Cross Blue Shield Virginia
- ▶ Arizona State University Center Health Information and Research
- ▶ Blue Cross Blue Shield Illinois *
- ▶ California Hospital Assessment and Reporting Taskforce Initiative
- ▶ California Cooperative Healthcare Reporting Initiative
- ▶ Indiana Health Information Exchange
- ▶ Massachusetts eHealth Collaborative
- ▶ Minnesota Community Measurement
- ▶ MedAllies (New York eHealth Collaborative Grantee)
- ▶ Wisconsin Collaborative for Healthcare Quality

Providers

- ▶ Brigham and Women's Hospital
- ▶ Cincinnati Children's Hospital Medical Center
- ▶ Citizens Memorial Healthcare
- ▶ HealthPartners
- ▶ Hospital Corporation of America
- ▶ Lehigh Valley Physician Group
- ▶ Partners Healthcare
- ▶ Partners Community Healthcare
- ▶ Charles River Medical Associates

Government

- ▶ Centers for Medicare and Medicaid Services
- ▶ Indian Health Services

* The interview guide was not used for the discussion.

Appendix B: Endnotes

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