AHRQ Quality Indicators

Quality Indicator Measure Development, Implementation, Maintenance and Retirement

Summary

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Overview

This document summarizes the Agency for Healthcare Research and Quality (AHRQ) Quality Indicator (QI) measure development, implementation, maintenance and retirement processes. The steps taken throughout the QI processes are described. Most of the activities performed are the responsibility of the QI measure team and supporting experts. The approximate time line for completion of each step is also indicated. The resources and time line for developing QI measures depend on factors such as: number of measures, stakeholder involvement, data requirements, and current measures available. This summary will be used in preparing a detailed QI processes document.

Phase I: QI Measure Development

Task 1: Identification of Candidate Indicators

Literature Review

Time line: Approximately 2.5 months

The first step in QI measure development is to conduct a literature review on the topic area to identify candidate indicators and supporting evidence. Background information on the topic area and experience are used to generate keywords. Publication time frame parameters may be specified in the event that a large number of resources are identified in initial searches. Keywords are revised, as relevant, throughout the literature review period. The reference lists of identified resources are also reviewed to identify additional articles. The evidence supporting current measures is evaluated, and needs and challenges in the field are identified. The information obtained from reviewing the available evidence is useful to the later validation and risk adjustment steps. This review also involves examining existing measure databases such as the National Quality Forum (NQF), for the topic area of interest. The current AHRQ QIs are also reviewed, given that their areas of focus may be easily adapted to the current topic area (e.g., slight modification to the denominator population to focus on a particular area of health care).

Expert Engagement

Time line: Throughout task

Experts are important to the QI measure development process, as they enhance the scientific acceptability of the QIs. Expert engagement helps facilitate the development of a conceptual model to inform the entire QI measure development process. As the QI measure development process proceeds (e.g., after the literature review or consultation with current experts), additional experts may be identified to enhance the understanding of the team in specific areas related to the topic of interest.

Experts already engaged. Experts already engaged with the QI measure development process include the primary technical team and subcontractors. These experts may have expertise related to measure development and/or expertise related to the specific topic area.

Additional Experts to Engage. Individuals with expertise in a specific area, or a group of experts in a specific topic area may be engaged beyond the current team of experts. Such additional experts may or may not have published in the area. Knowledge sharing groups may also be used to engage other agencies or organizations in the topic area of interest.

Selection of Candidate Indicators

Time line: Approximately 1 month

Based on the information obtained during the literature review, specific articles are selected for abstraction. At this early stage of development, broad acceptance criteria are used for the articles, as it is necessary to ensure that all relevant concepts are considered for further measure development. Articles are selected based on their relevance to measures of potential use with administrative data in the topic area of interest. The articles that are abstracted may make use of various types of data (e.g., laboratory or clinical data). Also, articles that describe a measure with limited empirical support (e.g., measures with poor sensitivity) may also be abstracted.

An abstraction form is used to systematically identify relevant information from each article [i.e., data source, outcome of interest, population at risk, patient risk factors or disparity factors, exclusion criteria, stratification or risk adjustment, level of measurement (patient, provider or area level), and measure performance (e.g., calibration and discrimination)]. Two or more members of the technical team first abstract the same article to ensure consistency in abstraction methods across the reviewers.

Task 2: Assessment of Candidate Indicators

Initial Specifications of Candidate Indicators and Existing QIs

Time line: Approximately 1 month
Measures abstracted from the literature are refined, given current measure development needs (e.g., relevant topic area and available data), to inform the initial specifications of candidate indicators. Measure definitions, numerators, denominators, and exclusion criteria are specified based on the topic area of interest, evidence identified in the literature, empirical analysis, current QI measure framework, and expertise. Additionally, available evidence supporting each candidate indicator is summarized according to NQF measure evaluation criteria: Technical Specifications, Importance, Scientific Acceptability, Usability, and Feasibility. Aspects of the measures in need of additional consideration are noted.

Current AHRQ QIs identified as having potential relevance to the topic area of interest are also refined to specify the appropriate definition, numerator, and denominator. The revised measure specification is used to perform initial analyses using Healthcare Cost and Utilization Project

(HCUP) data provided by AHRQ to further inform the candidate indicator specifications, which involve examining rates of the modified current AHRQ QI.

Panel Review

Time line: Approximately 3.5 months
The panel review provides clinical face validity (i.e., the QI measure assess what it "looks like" it will) for the indicators. The panel review involves two steps: (1) creation of a plan for the review and (2) execution of the panel review.

Panel review plan development. This process involves selection of relevant organizations and determination of panelist skill-sets necessary for the review of the candidate indicators. The number of panels needed is determined based on the topic area of interest, the candidate indicators identified, and the specialists necessary for each panel. Once the panel review plan is developed, contact letters are drafted (i.e., one for each organization and one for each nominee affiliated with the organizations). These letters also include background information on the AHRQ QIs. A general demographic survey is also created. This survey is provided to the nominees to determine general background information (e.g., degree), practice information (e.g., specialty), and availability. In parallel with the development of the contact information, a questionnaire is developed for use by the nominees in reviewing the candidate indicators. The brief questionnaire is designed to solicit needed measure feedback on areas identified during the specification process.

Panel review execution. This process involves active contact and interaction with the identified organization representatives and nominees. First, organizations are asked to nominate panelists with specific qualifications, which are specified in the development of the panel review plan. The nominees are then contacted and asked to complete a survey of demographic information to ensure their relevance to the panel and appropriate panel expertise. The nominees are reviewed by the development team to make sure they meet the panel criteria, which is determined by the needs of the specific QI measure development topic area. The selected panelists are asked to review the candidate indicators. Prior to the panel (i.e., conference call) they complete the measure review questionnaire. The information obtained is used to guide the panel discussion, which is conducted using the Delphi method. Following the conference call the candidate indicators are revised using the information obtained from the panel review. The panelists are asked to complete the measure review questionnaire on only the revised indicators.

Risk Adjustment

Time line: Approximately 3 months

The process of risk adjustment allows the candidate indicators to account for certain relevant factors (e.g., comorbidities) that may otherwise dilute the utility of the information obtained from the candidate indicators.

During the literature review and abstraction process, constructs relevant to risk adjustment are identified. The initial risk adjustment information, previous risk adjustment methods, and

expertise (from the team and panel review) are used to develop an initial list of covariates. The initial list of covariates will inform the development of an analytic plan. The analytic plan will be executed using HCUP data provided by AHRQ, and the model will be evaluated for performance. The risk adjustment model will be applied to the candidate indicator specifications.

Empirical Analyses

Time line: Approximately 2 months
The empirical analyses serve to determine relative bias of the candidate indicators, the precision and reliability of each indicator, rates and variation in rates, and the relatedness of the candidate indicators.

Information from the literature review (e.g., cases of coding bias), abstraction, previous empirical methods, and expertise (from the team and panel review) are used to develop an analytic plan. The analytic plan is executed with HCUP data provided by AHRQ. An additional component to the empirical analyses involves validation activities.[1] The validation activities involve medical record abstraction and review to determine the utility of using certain codes, as well as the rigor with which the codes are identifying the information relevant to the topic of interest.

Finalization of Specifications

Time line: Approximately 1 month

The initial specifications developed prior to the panel review are finalized to include evidence from the literature review, panel review, risk adjustment, and empirical analyses. The strengths and weaknesses of each candidate indicator are evaluated, and recommendations to strengthen the candidate indicators are proposed. The strongest candidate indicators are recommended for implementation by the development team. Generally, recommended candidate indicators have high face validity, confirmatory evidence of validity (e.g., from the literature), acceptability to the clinical panel, and adequate performance on empirical analyses.

Summary of Evidence for each Recommended Candidate Indicator

Time line: Approximately 2 months

Using the information from the finalized specifications, a summary of evidence is created for each recommended candidate indicator. The summary includes all relevant evidence gathered over the course of the QI measure development process. The summary of evidence for the recommended candidate indicators helps to facilitate the review and decision process on the candidate indicators.

[1] Historically validation activities have occurred during QI maintenance; however, this step has recently been included in the measure development phase.

AHRQ Review and Decision on Indicators

Time line: Approximately 1 month

AHRQ uses the finalized specifications and summary of evidence on the candidate indicators to determine if some or all of the recommended indicators warrant an additional development phase for inclusion in a publicly released module.

Phase II: QI Implementation

AHRQ endorses the advancement of recommended indicators to Phase II of QI measure development, the implementation phase.

Coding Quality Indicators into Software

Time line: Approximately 0.5 month

The software team codes the indicators into the software for release to users as a QI module. The QI module is incorporated into the software in a user friendly manner that is consistent with the implementation of previous QI modules.

Testing

Time line: Approximately 1 month

The newly coded QI module is tested according to current software testing processes to ensure accuracy and consistency. Testing includes identifying and deploying an appropriate test dataset for use with the AHRQ QIs. The testing occurs both internally and by an external entity as well. The SAS software is tested side by side with the WinQI software to evaluate the consistency of results produced by both sets of software.

User Documentation

Time line: Approximately 1.5 months

Throughout the coding and testing process, user documentation is developed that includes specifications (i.e., the definition, numerator, and denominators) for each QI, user guides (i.e., the evidence summaries for each measure), SAS and WinQI software documentation and logs of changes from the prior QI version to the current version.

Phase III: QI Maintenance – Preserving Scientific Acceptability

In order for the QIs to remain scientifically acceptable and useful, they must be maintained and potentially enhanced on a regular cycle. QIs need to be updated based on such factors as: recent evidence published in the literature (particularly as publications are made available using the specific QI) and from user feedback, technical specification updates including International Classification of Diseases-Ninth Revision-Clinical Modification (ICD-9-CM) coding updates, periodic clinical panel review, the NQF endorsement and maintenance process, and newly available data and methodological advances in the industry. Each of the material maintenance steps must be considered within the broader measure life cycle.

Evidence

Time line: Throughout task

Members of the QI measure development team maintain their expertise through continued review of literature relevant to the QIs. Feedback from users through the QI user support system or through presentations on the QIs is instrumental to QI maintenance. For example, user comments regarding QI specifications are monitored and considered by the measure development team during the annual review and coding update process.

Technical Specification Updates

Time line: Throughout task

The QI codes and risk adjustment covariates are updated annually to reflect fiscal year (ICD-9-CM) and Diagnosis-related Group (DRG) changes and currently available comparative data used for the reference population. Additionally, new Census data on the population of counties is updated, which is relevant to area-level measures[2].

Panel Review

Time line: Throughout task

A periodic clinical review panel is engaged if the evidence reviewed, user feedback, or coding changes warrant a detailed examination of the indicators. For example, a panel may be convened if it becomes apparent that there may be alternate uses for the QI.

National Quality Forum Submission and Maintenance

Time line: Throughout task

[2] The *QI Annual Review Procedures* delivered to AHRQ on January 7, 2011, details the coding update process.

NQF submission and endorsement is considered for all QIs developed. QIs that meet the NQF evaluation criteria are considered for submission. QIs accepted for endorsement enter a regular maintenance and annual review cycle established by NQF.

Newly Available Data and Methodological Advances

Time line: Throughout task

Measurement creates demand for better data and methods, and in turn these data and methods are incorporated into the measures. Recent examples include Present on Admission and hierarchical modeling. Members of the QI support team monitor efforts to enhance available data and to improve available methods. In addition, AHRQ and the QI support team have sought out potential data sources (e.g. electronic laboratory values) and convened workgroups of researchers and users to advance methodological approaches.

Phase IV: QI Retirement

Occasionally AHRQ has retired indicators by removing them from the software and documentation.

Evidence

Time line: Throughout task

Review of literature relevant to the QIs and feedback from users through the QI user support system or through presentations on the QIs occasionally may suggest that an indicator is no longer scientifically acceptable and should be removed from the QI module.

The determination of which QI are relevant for retirement in an evolving process. Going forward, the QI retirement criteria may include the following:

1. New evidence showing that the measure is no longer scientifically acceptable
    a. Loss of content validity – i.e., the process of care has been shown to be irrelevant or even harmful
    b. Loss of criterion validity – i.e., the available data cannot be used for the intended purpose, and cannot easily be fixed.
    c. Loss of predictive validity – i.e., an outcome no longer matters because it doesn't predict anything important to patients.
2. Evidence of unanticipated/undesirable consequences of implementing the measure, particularly as a result of manipulation or gaming by providers.

Remove Coding of Quality Indicators from Software

Time line: Approximately 0.5 month

The software team removes the codes for the retired indicators from the software for release to users. The QI is removed from the software in a user friendly manner that is consistent with the implementation of previous QI modules.

Testing

Time line: Approximately 0.5 month

The remaining indicators in the QI module are tested according to current software testing processes to ensure accuracy and consistency. Testing includes ensuring that the removal of the indicators did not introduce any unexpected consequences. The testing occurs both internally and by an external entity as well. The SAS software is tested side by side with the WinQI software to evaluate the consistency of results produced by both sets of software.

User Documentation

Time line: Approximately 0.5 month

User documentation is updated to remove the retired indicator from specifications (i.e., the definition, numerator, and denominators) for each QI, user guides (i.e., the evidence summaries for each measure), SAS and WinQI software documentation and logs of changes from the prior QI version to the current version.

Summary

The QI measure development process involves four phases. The first phase is candidate indicator development for an identified topic area of interest. The steps involved in the first phase are: (1) identification of candidate indicators, which includes literature review, expert engagement, and selection of candidate indicators and (2) assessment of candidate indicators, which includes specifications of candidate indicators and existing AHRQ QIs, panel review, risk adjustment, empirical analyses, finalization of specifications, and summary of evidence for each recommended candidate indicator. The second phase is implementation of the QIs into the AHRQ QI software, which involves coding the QIs into the software, testing, and developing user documentation. The third phase is maintenance of the QIs, which involves review of the evidence, technical specification updates, periodic clinical panel review, NQF endorsement submission and maintenance, and newly available data and methodological advances. The final phase is retirement which involves evidence, removing coding from software, testing and user documentation.

The length of the QI measure development process is approximately 20 months for development and 1.5 months for implementation, with a variable maintenance schedule (see Table 1).

Table 1. Quality Indicator Measure Development Time Line

Task	Average Completion Time
Phase I: QI Measure Development	**Approximately 20 months[1]**
Task 1: Identification of Candidate Indicators	
Literature Review	2.5 months
Expert Engagement	Throughout task
Selection of Candidate Indicators	1 month
Task 2: Assessment of Candidate Indicators	
Initial Specifications of Candidate Indicators and Existing QIs	1 month
Panel Review	3.5 months
Risk Adjustment	3 months
Empirical Analyses	2 months
Finalization of Specifications	1 month
Summary of Evidence for each Recommended Candidate Indicator	2 months
AHRQ Review and Decision on Candidate Indicators	1 month
Phase II: Implementation	**Approximately 1.5 months[1]**
Coding QIs into Software	0.5 months
Testing	1 month
User Documentation	1.5 months
Phase III: QI Maintenance	**Variable[1]**
Evidence	Throughout task
Technical Specification Updates	Once each year
Panel Review	As needed
NQF Submission and Maintenance	As needed
Newly Available Data and Methodological Advances	As needed
Phase IV: QI Retirement	**Variable[1]**
Evidence	Throughout task
Removing Coding QIs from Software	0.5 months
Testing	0.5 months
User Documentation	0.5 months

[1]This represents the approximate **total** time for QI measure development, given certain tasks run in parallel with each other.