

# THE NATIONAL QUALITY FORUM

The 'Hospital Care Outcomes & Efficiency' Steering Committee met via conference call on April 13, 2009 12:00-2:00pm ET.

*Steering Committee members present:* Bruce Boissonnault, MBA (Co-Chair); Frank Opelka, MD, FACS (Co-Chair); Tanya Alteras; Caroline Blaum, MD, MS; Niall Brennan, MPP; Donald Casey, MBA, MD, MPH, FACP; James Coates, MBA, MD; Constance Dahlin, MSN, BC, APRN; Amy Deutschendorf, MS, RN; Charles Homer, MD, MPH; Peter Kaboli, MD, MS; Eliot Lazar, MBA, MD; Doris Peter, PhD; Steve Phillips, MPA; Ileana Piña, MD.

*NQF Staff Present:* Karen Pace, Eric Colchamiro, Helen Burstin

*Measure Stewards Represented:* AHRQ, American College of Cardiology, CMS, Health Benchmarks, Society of Thoracic Surgeons, The Leapfrog Group

## WELCOME, INTRODUCTIONS, AND DISCLOSURE OF INTERESTS

Mr. Boissonnault welcomed the Steering Committee members. Committee members were asked to introduce themselves, and identify any potential conflicts of interest with the measures under review\*.

The purpose of the conference call was to:

- review recommended candidate measures (HOE-004, HOE-013, HOE-009/010) in comparison to similar NQF-endorsed measures; and
- identify any issues that might impact the Steering Committee's recommendations.

## Background

At its March meeting, the Steering Committee recommended several candidate measures (HOE-004, HOE-013, HOE-009/010) that are similar to existing NQF-endorsed measures as identified in the table below. At the time of the meeting, the committee did not have access the detailed measure specifications for all of the endorsed measures and the six individual Leapfrog measures to assess the similarities and differences between the new and endorsed measures. Therefore, NQF determined that the recommendations for these candidate measures should be conditional until the Committee had the opportunity to compare the candidate measures to the endorsed measures in accordance with the NQF evaluation criteria (see below).

NQF prefers not to endorse similar measures (e.g., same target outcome, same patient population) and strives for consensus on "best in class." Based on the NQF measure evaluation criteria (see next section), the reason for potentially endorsing more than one measure on a

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\* Doris Peter – consulting contracts with Leapfrog Group and STS, but not regarding the measures; other members reported no new disclosures.

specific topic is if the measures provide distinctive or additive value AND the specifications are harmonized with related measures to the extent possible.

In an ideal world of electronic health records, interoperability, and appropriate confidentiality policies that allow for linking and transferring data, one measure that can be used for all relevant patient groups, databases, and settings is preferable. This prevents the confusion that occurs when similar measures provide conflicting results. A major barrier in our current environment to having single measures that meet the needs of a variety of stakeholders is the lack of, or ability to aggregate, a comprehensive database (e.g., Medicare claims data vs. health plan claims data; Medicare patients in fee-for-service coverage vs. health plan). Thus, if a measure cannot be implemented for a substantial group of the target population, then more than one measure may be warranted in order to assess quality and facilitate improvement for all relevant patient groups.

When similar measures are needed, the measure specifications should be harmonized to the extent possible. In these cases, there also should be the expectation for demonstration of continued analysis and work to achieve a single measure with the broadest possible application at the time of measure maintenance. Additional analyses may include, but not be limited to:

- Comparative analyses of the measures using the same data set
- Identification and resolution of barriers to applying the measure to all relevant patient groups
- Identification of data elements needed in the electronic health record

### **NQF Evaluation Criteria Related to Similar Measures**

#### **3. Usability.**

**3b.** The measure specifications are harmonized\* with other measures, and are applicable to multiple levels and settings.

**3c.** Review of existing endorsed measures and measure sets demonstrates that the measure provides a distinctive or additive value to existing NQF-endorsed measures (e.g., provides a more complete picture of quality for a particular condition or aspect of healthcare, is a more valid or efficient way to measure).

\*Measure harmonization refers to the standardization of specifications for similar measures on the same topic (e.g., *influenza immunization* of patients in hospitals or nursing homes), or related measures for the same target population (e.g., eye exam and HbA1c for *patients with diabetes*), or definitions applicable to many measures (e.g., age designation for children) so that they are uniform or compatible, unless differences are dictated by the evidence. The dimensions of harmonization can include numerator, denominator, exclusions, and data source and collection instructions. The extent of harmonization depends on the relationship of the measures, the evidence for the specific measure focus, and differences in data sources.

Review of the similar measures should address the following questions.

- **What does the new measure address that the similar endorsed measure CANNOT achieve?**

For example, it might address patients, which are included in separate data sets (e.g., Medicare claims vs. private health plan claims) that are not readily available to others.

- **Could the endorsed measure be modified at this time to address the objective of the similar new measure?**

For example, if the endorsed measure can be modified to expand the age range or stratified to also measure a subset such as a particular age or diagnostic group, then an additional measure may not be warranted. Or perhaps, it's just a matter of providing the detailed data back to the provider for purposes of internal quality improvement (e.g., which patients were readmitted, declined immunization, etc.).

- **If the measures are essentially the same, does the similar new measure offer a superior methodology? If so, is it feasible for immediate widespread implementation?**

For example, a new measure based on clinical data may be considered superior to one using only claims data however it may be less feasible in the short-term.

- **If more than one measure is warranted, are the new measure specifications harmonized with the endorsed measure to the extent possible?**

### **Process for this Call**

Dr. Pace informed the Committee members that they will not be asked to vote again on the recommendations at this time; rather, the information on similar measures will be presented in the draft report and reviewers will be asked to comment specifically on these issues. The Committee will review comments submitted during the comment period as well as any additional comparative analyses that may be presented and then make a final decision on whether the new measures that are similar to endorsed measures should be recommended to the NQF membership for voting. A Committee member suggested that reviewers be asked to address the needs of its particular stakeholder group (e.g., hospital, consumer, payer).

During the call, the measure stewards for both the endorsed and new measures were invited to make some introductory comments. The Committee then discussed whether the new measure offered distinctive or additive value and was harmonized with the endorsed measure, to the extent possible.

## **COMPARISON OF RECOMMENDED NEW MEASURES TO SIMILAR ENDORSED MEASURES**

The following table identifies the new measures that are similar to an existing NQF-endorsed measure.

New Measures	Endorsed Measures
<p><b>HOE-009-08</b> 30-day all-cause risk-standardized percutaneous coronary intervention (PCI) mortality rate for patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock (Centers for Medicare and Medicaid Services)</p> <p><b>HOE-010-08</b> 30-day all-cause risk-standardized Percutaneous Coronary Intervention (PCI) mortality rate for patients with ST segment elevation myocardial infarction (STEMI) or cardiogenic shock (Centers for Medicare and Medicaid Services)</p> <p><b>HOE-020</b> Survival Predictor for Percutaneous Coronary Interventions (PCI) (Leapfrog Group)</p>	<p><b>NQF# 0133</b>, PCI mortality risk-adjusted (ACC)</p>
<p><b>HOE-019</b> Survival Predictor for CABG Surgery (Leapfrog Group)</p>	<p><b>NQF# 0119</b>, Risk-Adjusted Operative Mortality for CABG (STS)</p>
<p><b>HOE-022</b> Survival Predictor for Aortic Valve Replacement (AVR) (Leapfrog Group)</p>	<p><b>NQF# 0120</b>, Risk-Adjusted Operative Mortality for Aortic Valve Replacement (STS)</p>
<p><b>HOE-021</b> Survival Predictor for Abdominal Aortic Aneurysm (AAA) (Leapfrog Group)</p>	<p><b>NQF# 0359</b>, Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11) (risk adjusted) (AHRQ)</p>
<p><b>HOE-023</b> Survival Predictor for Esophagectomy Surgery (Leapfrog Group)</p>	<p><b>NQF# 0360</b>, Esophageal Resection Mortality Rate (IQI 8) (risk adjusted) (AHRQ)</p>
<p><b>HOE-024</b> Survival Predictor for Pancreatic Resection Surgery (Leapfrog Group)</p>	<p><b>NQF# 0365</b>, Pancreatic Resection Mortality Rate (IQI 9) (risk adjusted) (AHRQ)</p>
<p><b>HOE-004-08</b> Risk-Adjusted 30-Day Readmission Rate For Heart Failure (Health Benchmarks, Inc)</p>	<p><b>NQF# 0330</b>, 30-Day All-Cause Risk Standardized Readmission Rate Following Heart Failure Hospitalization risk adjusted (CMS)</p>

## Overarching Issues

Several Steering Committee members reiterated previous sentiments of the Committee and TAP that it is difficult to evaluate “best in class” without head-to-head comparisons of the similar measures on the same data set to see whether different hospitals rank differently and to understand the differences before endorsing the new measure. Others also expressed that a determination of better methodology requires in-depth technical expertise related to measurement properties such as risk adjustment, reliability, and validity. A committee member suggested that NQF expand the measure evaluation framework to better address comparison of similar measures to determine whether the additional measures are justified and adequately harmonized. Several Committee members also restated prior discussions that multiple similar measures create confusion, especially if the measures are likely to result in different scores and if the nuanced differences are difficult to explain. Multiple measures also may create additional burden for providers if they are expected to collect data for multiple similar measures.

Therefore, endorsing additional measures that are similar to already endorsed measures should be well justified. One committee member expressed concern that NQF over-emphasizes harmonization, which could stifle innovation.

Based on the review of the differences identified in the new measures and Committee discussion, it appears that a primary driver for some of the new measure submissions relates to a lack of accessibility of information to implement the existing measures including: 1) hospital identifiers are not always available in claims data, 2) the detailed specifications and programming code to easily implement an existing measure are not available, or 3) the data needed to compute a measure are not publicly available and the measure scores also are not publicly reported. Therefore, the Committee grappled with decisions about a new measure when the existing measure was suitable but had some accessibility issues. Some committee members expressed a strong preference for measures that are based on data that include all providers and do not require permission by the providers to be included in the reporting of results (e.g., billing and discharge data in several large states). A committee member commented that statistical problems arise when poor performers in a population can simply opt out of reporting data.

The six Leapfrog measures are similar to endorsed measures of three different stewards (AHRQ, ACC, STS). Some of the following discussion pertains to all the Leapfrog measures. The AHRQ measure developer commented that the AHRQ and Leapfrog measures could be considered complementary if the Leapfrog measures were viewed as more suitable for consumer decision making and forecasting future performance. He noted it's a complicated issue and would depend on the argument that a consumer makes a better choice with one measure rather than information on mortality and volume. One Committee member commented that consumers don't know how to put volume and outcome information together. It also was clarified that there is nothing inherent in the AHRQ measures that prevent computing and reporting rates for providers with small case volume. The scores for small case volumes will have wider confidence intervals, which are reported, and there may be some restrictions related to confidentiality when reporting on very low numbers of cases. In response to a question about what risk model was used when determining there was no difference in the Leapfrog measures with or without risk adjustment, the steward responded that the risk factors included demographics and comorbidities available in claims data.

### **Online Discussion regarding Public Reporting**

Some Committee members engaged in online discussion following the conference call regarding provider participation in and accessibility of data sources, specifically comparing the STS measures for CABG and AVR to the proposed Leapfrog measures. The following lists include information regarding the two data sources.

#### STS Measures

- Participation in the registry is voluntary
- Participation is reported as "90% of cardiac surgery centers" so the database for developing the risk model and comparative scores is comprehensive
- Participants report clinical data as defined by registry

- Some states may require reporting of these measures; STS reports back to the participating providers and to some payers/plans through agreed upon contractual arrangements; some surgeons report their scores directly to payers/plans

### Leapfrog Measures

- Participation is voluntary through a Leapfrog survey
- Overall participation is reported as: "The 2008 Survey was voluntarily completed by 1,282 acute care hospitals across 37 regions in 44 states – representing more than 50% of targeted inpatient beds in these regions" (a comparable percentage of 'cardiac surgery centers' is not known)
- Participants report aggregate volume and mortality data from its own claims data
- The model for the volume-predicted rate was based on a national database so participation does not affect that component; comparative scores would include those participating
- Leapfrog publicly reports scores

NQF endorses measures that are intended for both public reporting and quality improvement, however, there is no requirement for implementation so endorsement essentially means a measure is suitable for both purposes. The Committee's discussion is indicative of the different perspectives on public reporting summed up by the question – what is public reporting?

The various perspectives on public reporting include, but are not limited to, the following range of activities. These varying perspectives are, at least in part, the impetus for many of the new measures that are similar to the existing endorsed measures and need to be considered in the decisions regarding similar measures.

- Use of a publicly available database that includes all providers (e.g., uniform claims data because all providers bill for services) to compute and report measure scores (AHRQ QIs - Texas Health Care Information Collection)
- Required reporting of data by all providers to compute and report measure scores, which are available to anyone including consumers, purchasers, health plans, etc. (e.g., CMS Nursing Home or Home Health Compare, state mandatory reporting of data or scores produced by registry)
- Voluntary reporting of data to compute measure scores for external reporting, which are available to anyone including consumers, purchasers, health plans, etc. (e.g., Leapfrog model, CMS Hospital Compare)
- Voluntary reporting of measure scores to an external entity (e.g., health plan, purchaser) – i.e., the measure is not just used for internal quality improvement (e.g., hospital reports its scores produced by a registry)

Public reporting often is associated with being freely available, especially with federal and state reporting initiatives; however, all of the above activities could conceivably have some charge depending on the sponsoring entity. Therefore, an additional consideration might include whether there's a charge and if that changes whether it can be considered public reporting.

One committee member suggested that NQF should develop more specific criteria for evaluating the data source on inclusiveness of relevant providers, public accessibility, and control of the data.

## **NQF MEMBER AND PUBLIC COMMENTS**

NQF members and public audience members were given the opportunity to make comments. The following points were addressed.

- Mention of SCAI previous letter HOE-009/010 already distributed to the Committee
- Mention of Next Wave letter already distributed to the Committee
- Because of small case volume for esophagectomy, rates can change from 0% to 100% in one year. Some small volume providers do very well and STS found no statistically significant differences in outcome by volume.
- Should consider differences in measures used for provider selection vs. improvement

## **Tables Comparing New Submitted Measures to Endorsed Measures**

The following tables present the measure specifications for the endorsed and the similar recommended new measures. Differences and harmonization issues and potential distinctive or additive value are identified.

<b>PCI Mortality – NQF#0133, HOE-009/010, HOE-020</b> .....	8
<b>CABG Mortality – NQF#0119, HOE-019</b> .....	15
<b>AVR Mortality – NQF#0120, HOE-022</b> .....	18
<b>AAA Mortality – NQF#0359, HOE-021</b> .....	21
<b>Esophageal Resection Mortality – NQF#0360, HOE-023</b> .....	24
<b>Pancreatic Resection Mortality – NQF#0365, HOE-024</b> .....	27
<b>HF Readmission – NQF#0330, HOE-004</b> .....	30

## PCI Mortality – NQF#0133, HOE-009/010, HOE-020

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
<b>Title</b>	In-Hospital Risk Adjusted Mortality for Percutaneous Coronary Intervention (PCI) ©	30-day all-cause risk-standardized percutaneous coronary intervention (PCI) mortality rate for patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock	30-day all-cause risk-standardized Percutaneous Coronary Intervention (PCI) mortality rate for patients with ST segment elevation myocardial infarction (STEMI) or cardiogenic shock	Survival Predictor for Percutaneous Coronary Interventions (PCI)©
<b>Status</b>	Endorsed 5/9/2007	Recommended by SC 3/4/2009	Recommended by SC 3/4/2009	Recommended by SC 3/4/2009
<b>Steward</b>	American College of Cardiology	Centers for Medicare and Medicaid Services	Centers for Medicare and Medicaid Services	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>In-hospital mortality</li> <li>All PCI patients (STEMI/non-STEMI in risk model)</li> <li>Risk adjusted - logistic regression; uses clinical data</li> <li>Clinical registry data - currently over 1000 hospitals report (70% of those doing PCI)</li> <li>Scores reported to participants unless required reporting in a few states</li> </ul>	<ul style="list-style-type: none"> <li>30-day mortality</li> <li>PCI patients broken into 2 cohorts/measures (w/o STEMI &amp; w/o shock; w/STEMI or w/shock)</li> <li>Risk adjusted - hierarchical model; uses clinical data</li> <li>Clinical registry data</li> <li>Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality</li> <li>CMS intends to publicly report measure scores for all hospitals</li> </ul>	See HOE-009	<ul style="list-style-type: none"> <li>In-hospital survival</li> <li>All PCI patients</li> <li>No risk adjustment</li> <li>Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive/Additive Value</b>	<ul style="list-style-type: none"> <li>NQF-endorsed measure</li> </ul>	<ul style="list-style-type: none"> <li>30-day mortality has standard time period instead of varying with discharge/transfer, which can confound results</li> <li>30-day period encompasses in-hospital deaths (potential for stratification)</li> <li>Steward indicates more suitable for public reporting</li> <li>ACC &amp; CMS developers think measures are complementary</li> </ul>	See HOE-009	<ul style="list-style-type: none"> <li>Useful if clinical registry data not accessible or if measure scores are not publicly reported</li> <li>Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	In-Hospital risk-adjusted mortality following PCI	Hospital-specific 30-day all-cause risk-standardized mortality rate following	Hospital-specific 30-day all-cause risk-standardized mortality rate following	A reliability adjusted measure of PCI performance that optimally combines

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
		Percutaneous Coronary Intervention (PCI) among patients aged 18 years or older without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock at the time of procedure.	Percutaneous Coronary Intervention (PCI) among patients aged 18 years or older with ST segment elevation myocardial infarction (STEMI) or cardiogenic shock at the time of procedure.	two important domains: PCI hospital volume and PCI operative mortality, to provide predictions on PCI survival rates for hospitals.
<b>Outcome</b>	Patients with a PCI procedure performed during admission who expired  Time Window = during the hospital admission	Outcome: death in PCI patients without ST segment elevation MI (STEMI) and without cardiogenic shock  Time Window = within 30 days of PCI procedure	Outcome: death in PCI patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock  Time Window = within 30 days of PCI procedure	Outcome: Survival rate of patients who undergo a PCI procedure.  Time Window = during the hospital admission
<b>Population</b>	Patients with a PCI procedure performed during admission  Quarterly data submissions that passed the CathPCI Registry's data quality and completeness checks. Time window=quarterly to include previous four quarters of data	Outcome measure cohort definition: PCI procedures for patients at least 18 years of age, without STEMI and without cardiogenic shock at the time of procedure, including outpatient and observation stay patients who have undergone PCI but not been admitted.  Time Window: This measure was developed with 24 months of data. The time period for public reporting has not been determined.	Outcome measure cohort definition: PCI procedures for patients at least 18 years of age, with STEMI or cardiogenic shock at the time of procedure, including outpatient and observation stay patients who have undergone PCI but not been admitted.  Time Window: This measure was developed with 24 months of data. The time period for public reporting has not been determined.	Included Population: All hospital patients who had a PCI procedure.  Time Window = 12 months
<b>Exclusions</b>	1. NCDR CathPCI Registry patients who did not have a PCI (Patient admissions with a diagnostic cath only during that admission); 2. Data submissions that do not pass the data quality and completeness reports; 3. Procedure variables for subsequent PCIs during the same admission (if the patient had more than one PCI procedure during that admission). 4. Patient admissions with PCI who transferred to another facility on discharge; 5. Patient admissions with PCI who have more than two variables in the risk model that are	Note: We are using this field to define exclusions to the patient cohort.  (1) PCIs that follow a prior PCI in the same admission or occur during a transfer-in admission (PCI to PCI). We define an episode of care as starting on the day of the PCI during the first admission regardless of whether additional procedures are performed at the same hospital or at a different hospital after transfer. Thus, in the period of evaluation after the index procedure we do not begin a new period of evaluation after a second PCI during the same episode of care. If the patient is discharged to a non-acute care facility and has a second PCI	Note: We are using this field to define exclusions to the patient cohort.  (1) PCIs that follow a prior PCI in the same admission or occur during a transfer-in admission (PCI to PCI). We define an episode of care as starting on the day of the PCI during the first admission regardless of whether additional procedures are performed at the same hospital or at a different hospital after transfer. Thus, in the period of evaluation after the index procedure we do not begin a new period of evaluation after a second PCI during the same episode of care. If the patient is discharged to a non-acute care facility and has a second PCI	none

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
	missing. 6. Patients <18 years of age.	<p>within 30-days, that PCI is eligible as a new index PCI (except as noted in 3 below).</p> <p>(2) PCIs in patients with missing vital status (inability to link patient information to appropriate death index). In actual practice, with the identifiers that will be collected as part of the database we anticipate that missing data will be rare.</p> <p>(3) PCIs which would lead to duplicate attribution of 30-day deaths. The 30-day outcome period for patients with more than one PCI may overlap. In order to avoid attributing the same death to more than one PCI (i.e. double counting a single patient death), later PCI procedures within 30 days of the death are excluded.</p> <p>(4) PCIs for patients with more than 10 days between date of admission and date of PCI. Patients who have a PCI after many days of hospitalization are rare and represent a distinct population that likely has risk factors related to the hospitalization that are not well quantified in the registry. It seemed clinically sensible to exclude these patients.</p>	<p>within 30-days, that PCI is eligible as a new index PCI (except as noted in 3 below).</p> <p>(2) PCIs in patients with missing vital status (inability to link patient information to appropriate death index). In actual practice, with the identifiers that will be collected as part of the database we anticipate that missing data will be rare.</p> <p>(3) PCIs which would lead to duplicate attribution of 30-day deaths. The 30-day outcome period for patients with more than one PCI may overlap. In order to avoid attributing the same death to more than one PCI (i.e. double counting a single patient death), later PCI procedures within 30 days of the death are excluded.</p> <p>(4) PCIs for patients with more than 10 days between date of admission and date of PCI. Patients who have a PCI after many days of hospitalization are rare and represent a distinct population that likely has risk factors related to the hospitalization that are not well quantified in the registry. It seemed clinically sensible to exclude these patients.</p>	
<b>Methods &amp; Risk Adjustment</b>	<p>Risk adjustment methodology is a logistic regression analysis.</p> <p>The model assigned weights to risk factors or variables reflecting the strength of their association to PCI in-hospital mortality. Each patient in a facilities submission is given a risk score to predict risk of in</p>	<p>We use hierarchical logistic regression modeling to calculate a hospital-specific 30-day risk-standardized mortality rate (RSMR). This rate is calculated as the ratio of “predicted” to “expected” deaths, multiplied by the national unadjusted mortality rate. For each hospital, the “numerator” of the ratio component of the RSMR is the predicted number of deaths within 30 days given the hospital’s performance</p>	<p>We use hierarchical logistic regression modeling to calculate a hospital-specific 30-day risk-standardized mortality rate (RSMR). This rate is calculated as the ratio of “predicted” to “expected” deaths, multiplied by the national unadjusted mortality rate. For each hospital, the “numerator” of the ratio component of the RSMR is the predicted number of deaths within 30 days given the hospital’s performance</p>	<p>Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate</p>

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
	<p>hospital mortality and accurately report risk adjusted mortality rates during hospitalization.</p> <p>The most noteworthy risk factors or variables in the model include:</p> <ol style="list-style-type: none"> <li>1. ST-segment elevation MI defined as a patient who had a STEMI on admission, with an onset within 24 hours, or the procedure indication was primary, rescue or facilitated PCI.</li> <li>2. Discharge status (alive or expired).</li> <li>3. Glomerular filtration rate (</li> <li>4. Body mass index (BMI) (kg/m<sup>2</sup>)</li> </ol> <p>Other Risk Adjustment Variables</p> <ul style="list-style-type: none"> <li>Age (for age≤70, for age&gt;70)</li> <li>Cardiogenic Shock at Admission</li> <li>Previous History - CHF</li> <li>Peripheral Vascular Disease</li> <li>Chronic Lung Disease</li> <li>GFR (for STEMI, for non-STEMI)</li> <li>NYHA Class IV (STEMI, non-STEMI )</li> <li>PCI Status (for STEMI, for non STEMI)</li> <li>- Urgent</li> <li>- Emergency</li> <li>- Salvage</li> <li>Previous Vascular Disease</li> <li>Cerebrovascular Disease</li> <li>Previous PCI</li> <li>Pre-procedure IABP</li> <li>Ejection Fraction Percentage</li> <li>Coronary Lesion ≥= 50%: Subacute Thrombosis?</li> <li>Highest Risk Pre-Procedure TIMI Flow = None vs. Yes</li> <li>Diabetes/Control (Non-Insulin Diabetes vs. No Diabetes; Insulin Diabetes vs. No Diabetes)</li> <li>Highest Risk Lesion: SCAI Lesion Class (II or III vs. I; IV vs. I)</li> <li>BMI [kg/m<sup>2</sup>] (for STEMI, for Non-</li> </ul>	<p>with its observed case mix, and the “denominator” is the expected number of deaths given the hospital’s case mix. By convention, we use the term “predicted” here to describe the numerator result, which is calculated using the hospital-specific intercept term. We use “expected” for the denominator, which is calculated using the average intercept term.</p> <p>More specifically, the expected number of deaths for each hospital is estimated using its patient mix and the average hospital-specific intercept. The predicted number of deaths for each hospital is estimated given the same patient mix but the hospital-specific intercept. Operationally, the expected number of deaths for each hospital is obtained by regressing the risk factors (see # 8) on the death using all hospitals in our sample, applying the subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, transforming, and then summing over all patients in the hospital to get a value. This is a form of indirect standardization. The predicted hospital outcome is the number of deaths in the “specific” hospital estimated given its performance and case mix. Operationally, this is accomplished by estimating a hospital-specific intercept that represented baseline mortality risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, transforming, and then summing over all patients in the hospital to get a value. To assess hospital performance</p>	<p>with its observed case mix, and the “denominator” is the expected number of deaths given the hospital’s case mix. By convention, we use the term “predicted” here to describe the numerator result, which is calculated using the hospital-specific intercept term. We use “expected” for the denominator, which is calculated using the average intercept term.</p> <p>More specifically, the expected number of deaths for each hospital is estimated using its patient mix and the average hospital-specific intercept. The predicted number of deaths for each hospital is estimated given the same patient mix but the hospital-specific intercept. Operationally, the expected number of deaths for each hospital is obtained by regressing the risk factors (see Section #8) on the death using all hospitals in our sample, applying the subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, transforming, and then summing over all patients in the hospital to get a value. This is a form of indirect standardization. The predicted hospital outcome is the number of deaths in the “specific” hospital estimated given its performance and case mix. Operationally, this is accomplished by estimating a hospital-specific intercept that represented baseline mortality risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, transforming, and then summing over all patients in the hospital to get a value. To assess hospital performance</p>	<p>back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].</p> <p>Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing PCI surgeries (thus, it includes all PCI surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all PCIs performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is also the group of PCI cases, the data needed for this domain is the number of observed deaths occurring for PCI cases, within the inpatient setting.</p>

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
	STEMI) Highest Risk Lesion - Segment Category (for STEMI, for non STEMI) -pRCA/mLAD/pCIRC -pLAD -Left Main	in any given year, we re-estimate the model coefficients using that year's data. (Please see the attached methodology report for details of the statistical methodology.)  Risk Adjustment Variables Age (10 year increments) Body Mass Index (5 kg/m <sup>2</sup> increments) Heart Failure - Previous History Cerebrovascular disease Peripheral Vascular Disease Chronic Lung disease Diabetes/Control 0=No Diabetes 1=Non-Insulin Diabetes 2=Insulin Diabetes Glomerular Filtration Rate (GFR) (derived) 0=Not measured 1="GFR<30" 2="30≤GFR<60" 3="60≤GFR<90" 4="GFR≥90" Previous PCI Heart Failure - Current Status NYHA: Class IV Symptom Onset No MI on admission MI within 24 hours of admission MI > 24 hours after admission Ejection Fraction Percent (EF) 1=Not measured 2="EF<30" 3="30≤ EF<45" 4="EF≥45" PCI status 1=Elective 2=Urgent 3=Emergency or 4=Salvage Highest Risk Lesion - coronary artery segment category	in any given year, we re-estimate the model coefficients using that year's data. (Please see the attached methodology report for details of the statistical methodology.)  Risk Adjustment Variables Age (10 year increments) Body Mass Index (5 kg/m <sup>2</sup> increments) Cerebrovascular disease Chronic Lung disease Glomerular Filtration Rate (GFR) (derived) 0=Not measured 1="GFR<30" 2="30≤GFR<60" 3="60≤GFR<90" 4="GFR≥90" Previous PCI Heart Failure - Current Status Cardiogenic shock on admission Symptom Onset No MI on admission MI within 24 hours of admission MI > 24 hours after admission Ejection Fraction Percent (EF) 1=Not measured 2="EF<30" 3="30≤ EF<45" 4="EF≥45" PCI status 1=Elective 2=Urgent 3=Emergency 4=Salvage Highest Risk Lesion - coronary artery segment category 1=proximal Right Coronary Artery (RCA)/mid Left Anterior Descending (LAD) artery/proximal Circumflex Artery	The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality  Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)  Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure, or can be derived from claims data). *Any negative values are reset to "0"  Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
		<p>1=proximal RCA/mid LAD/proximal Cx  2=proximal LAD  3=Left Main  Highest Risk Lesion: Society for Cardiovascular Angiography and Interventions (SCAI)  class 1  class 2 or 3  class 4</p> <p>For more details, please see the attached methodology report.</p>	<p>(Cx)  2=proximal LAD  3=Left Main  Highest Risk Lesion: Society for Cardiovascular Angiography and Interventions (SCAI)  class 1  class 2 or 3  class 4</p> <p>For more details, please see the attached methodology report.</p>	
<b>Outcome Details/Codes</b>				For the observed mortality, the hospital submits the observed deaths for PCI cases as identified using the denominator codes
<b>Population Details/Codes</b>	ACC-NCDR CathPCI Registry patient admissions with PCI procedure=yes	<p>We are using this field to specify the codes that define the PCI patient cohort.</p> <p>In the CathPCI Registry, admissions with PCI are identified by field 614 (PCI=yes); STEMI and shock are defined as follows:  (1) Symptoms present on admission = ACS:STEMI (field 550 = 6) with Time Period Symptom Onset to Admission within 24 hours (field 560 = 1,2,3) or Acute PCI = Yes (field 812 = 2,3,4); OR  (2) Cardiogenic shock = Yes (field 520=1).</p> <p>All patients who do not meet any of the above criteria are patients with no STEMI within 24 hours of arrival to the hospital and no cardiogenic shock prior to the PCI. These patients are included in the without STEMI and without shock cohort.</p>	<p>We are using this field to specify the codes that define the PCI patient cohort</p> <p>In the CathPCI Registry, admissions with PCI are identified by field 614 (PCI=yes); STEMI or shock is defined as follows:  (1) Symptoms present on admission = ACS:STEMI (field 550 = 6) with Time Period Symptom Onset to Admission within 24 hours (field 560 = 1,2,3) or Acute PCI = Yes (field 812 = 2,3,4); OR  (2) Cardiogenic shock = Yes (field 520=1)</p>	<p>For both the volume predicted mortality and observed mortality, hospitals count the number of all PCI cases using the following codes.</p> <p>ICD-9-CM Procedure Codes for PCI procedures  00.66 Percutaneous transluminal coronary angioplasty (PTCA) or coronary atherectomy  36.01 Single vessel percutaneous transluminal coronary angioplasty without mention of thrombolytics (code discontinued 10/1/2005)  36.02 Single vessel percutaneous transluminal coronary angioplasty with mention of thrombolytics (code discontinued 10/1/2005)  36.05 Multiple vessel PTCA at the same session with or without mention of thrombolytics (code discontinued 10/1/2005)  36.06 Insertion of non-drug eluting coronary stents  36.07 insertion of drug eluting</p>

	NQF Endorsed Measure# 0133	New Measure# HOE-009-08	New Measure# HOE-010-08	New Measure# HOE-020-08
				coronary stents
<b>Exclusion Details/Codes</b>	<p>If one or two variables are missing, the value is imputed for certain characteristics (see appendix 2 of the NCDR CathPCI Registry PCI Risk Adjusted Mortality Model 2008 for more information). If the value is missing for more than two variables, the patient record is excluded. However, in our data quality program, all variables in the risk model have a high "inclusion" criteria. This means that, when a hospital submits data to us, they need to have a high level of completeness (around 99%) for those variables. If they are not able to meet the criteria in our data quality program, they do not receive risk adjusted mortality for the records they submitted for that quarter.</p> <p>Exclusion examples:</p> <ol style="list-style-type: none"> <li>1. 98.1% of facilities submitting data pass the data quality and completeness checks, thus have their quarterly data analyzed.</li> <li>2. In developing and testing this updated model, only 39 patients records (0.012%) were excluded because of missing variables out of a total of 302,958 patient records.</li> </ol>	We are deriving the corresponding codes based on the data for exclusion.	We are deriving the corresponding codes based on the data for exclusion.	
<b>Data Source</b>	Electronic Clinical Registry - National Cardiovascular Data Registry® CathPCI Registry	Electronic Clinical Registry - National Cardiovascular Data Registry® CathPCI Registry, Other -Death Index	Electronic Clinical Registry- National Cardiovascular Data Registry® CathPCI Registry, Other - Death Index	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)
<b>Setting</b>	Hospital	Hospital	Hospital	Hospital

## CABG Mortality – NQF#0119, HOE-019

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0119	New Measure# HOE-019-08
<b>Title</b>	Risk-Adjusted Operative Mortality for CABG	Survival Predictor for CABG Surgery©
<b>Status</b>	Endorsed 5/9/2007	Recommended by SC 3/4/2009
<b>Steward</b>	Society of Thoracic Surgeons	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>Mortality</li> <li>Clinical registry data</li> <li>Risk-adjusted – logistic regression and hierarchical modeling using clinical data</li> <li>Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality</li> <li>Scores reported to participating hospitals unless required reporting in a few states</li> </ul>	<ul style="list-style-type: none"> <li>Survival</li> <li>Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>No risk adjustment</li> <li>Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive / Additive Value</b>	<ul style="list-style-type: none"> <li>NQF-endorsed measure</li> </ul>	<ul style="list-style-type: none"> <li>Useful if clinical registry data not accessible or if measure scores are not publicly reported</li> <li>Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	Percent of patients undergoing isolated CABG who die during the hospitalization in which the CABG was performed or within 30 days of the procedure.	A reliability adjusted measure of CABG surgical performance that optimally combines two important domains: CABG operative mortality and CABG hospital volume, to provide predictions on CABG survival rates for hospitals.
<b>Outcome</b>	Number of patients undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure	Outcome: Survival of patients who undergo an isolated CABG procedure  Time Window = during the hospital admission
<b>Population</b>	All patients undergoing isolated CABG procedures	Included Population: All hospital patients who had an isolated CABG procedure.  Time Window = 12 months
<b>Exclusions</b>	Patients <20 years	TPatients receiving CABG with concomitant valve replacement or repair
<b>Methods &amp; Risk Adjustment</b>	<p>Risk Adjustment: Multivariate logistic regression and hierarchical modeling</p> <p>Risk Adjustment Variables</p> <ul style="list-style-type: none"> <li>Afib</li> <li>Age</li> <li>Age Function 1 max(age-50,0)</li> <li>Age Function 2 max(age-60,0)</li> <li>Age x Reop Function</li> <li>Age x Status Function</li> <li>BSA Function 1</li> <li>BSA Function 2</li> <li>CHF but not NYHA IV</li> <li>CHF and NYHA IV</li> <li>CLD - Mild</li> <li>CLD - Moderate</li> <li>CLD - Severe</li> <li>Creatinine Function 1</li> <li>Creatinine Function 2</li> </ul>	<p>Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].</p> <p>Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and</p>

	NQF Endorsed Measure# 0119	New Measure# HOE-019-08
	Creatinine Function 3 CVD without Prior CVA CVD and Prior CVA Diabetes - Noninsulin Diabetes - Insulin Dialysis Ejection Fraction Function Female Female x BSA Function 1 Female x BSA Function 2 Hypertension IABP or Inotropes Immunosuppressive Treatment Insufficiency - Aortic Insufficiency - Mitral MI 1 to 21 days MI >6 and <24 hours MI = 6 hours No. Diseased. Vessel Function PCI = 6 hours PVD Reop - 1 Previous Operation Reop - =2 Previous Operations Shock Status - Urgent Status - Emergent Status - Salvage Unstable Angina	<p>thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing CABG surgeries (thus, it includes all CABG surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all CABGs (derived from claims data) performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is narrowed to a group of isolated CABG cases, the data needed for this domain is the number of observed deaths occurring for isolated CABG cases (derived from claims data), within the inpatient setting.</p> <p>The general composite measure calculation is as follows:            Predicted Survival = 1-Predicted Mortality</p> <p>Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)</p> <p>Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure, or can be derived from claims data).            *Any negative values are reset to "0"</p> <p>Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).</p>
<b>Outcome Details/Codes</b>		For the observed mortality, the hospital submits the observed deaths for isolated CABG cases as identified using the denominator codes and exclusion codes (or can be derived from claims data)
<b>Population Details/Codes</b>		For the volume predicted mortality, hospitals count the number of CABG cases using the following procedure codes.  ICD-9-CM Procedure Codes for CABG 36.10 Aortocoronary bypass for heart revascularization,NOS 36.11 Aortocoronary bypass of one coronary artery 36.12 Aortocoronary bypass of two coronary arteries 36.13 Aortocoronary bypass of three coronary arteries 36.15 Single internal mammary-coronary artery bypass 36.16 Double internal mammary-coronary artery bypass 36.19 Other bypass anastomosis for heart

	NQF Endorsed Measure# 0119	New Measure# HOE-019-08
		<p>revascularization</p> <p>For the observed mortality hospitals count the number of isolated CABG cases, then exclude cases with concomitant valve replacement or repair as identified in the exclusion codes.</p>
<b>Exclusion Details/Codes</b>		<p>For the observed mortality, hospitals exclude cases with a concomitant valve procedure; codes for the exclusion are:</p> <p>ICD-9-CM Procedure Codes: 35.10-35.29</p> <p>35.10 Open heart valvuloplasty without replacement, unspecified valve</p> <p>35.11 Open heart valvuloplasty of aortic valve without replacement</p> <p>35.12 Open heart valvuloplasty of mitral valve without replacement</p> <p>35.13 Open heart valvuloplasty of pulmonary valve without replacement</p> <p>35.14 Open heart valvuloplasty of tricuspid valve without replacement</p> <p>35.20 Replacement of unspecified heart valve</p> <p>35.21 Replacement of aortic valve with tissue graft</p> <p>35.22 Other replacement of aortic valve</p> <p>35.23 Replacement of mitral valve with tissue graft</p> <p>35.24 Other replacement of mitral valve</p> <p>35.25 Replacement of pulmonary valve with tissue graft</p> <p>35.26 Other replacement of pulmonary valve</p> <p>35.27 Replacement of tricuspid valve with tissue graft</p> <p>35.28 Other replacement of tricuspid valve</p>
<b>Data Source</b>	Electronic Clinical Database - STS National Adult Cardiac Surgery Database	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)
<b>Setting</b>	Hospital	Hospital

## AVR Mortality – NQF#0120, HOE-022

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0120	New Measure# HOE-022-08
<b>Title</b>	Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)	Survival Predictor for Aortic Valve Replacement (AVR)©
<b>Status</b>	Endorsed 5/9/2007	Recommended by SC 3/4/2009
<b>Steward</b>	Society of Thoracic Surgeons	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>Mortality</li> <li>Clinical registry data</li> <li>Risk-adjusted – logistic regression and hierarchical modeling using clinical data</li> <li>Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality</li> <li>Scores reported to participating hospitals unless required reporting in a few states</li> </ul>	<ul style="list-style-type: none"> <li>Survival</li> <li>Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>No risk adjustment</li> <li>Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive / Additive Value</b>	<ul style="list-style-type: none"> <li>NQF-endorsed measure</li> </ul>	<ul style="list-style-type: none"> <li>Useful if clinical registry data not accessible or if measure scores are not publicly reported</li> <li>Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	Percent of patients undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the [procedure] was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure.	A reliability adjusted measure of AVR surgical performance that optimally combines two important domains: AVR hospital volume and AVR operative mortality, to provide predictions on AVR survival rates for hospitals.
<b>Outcome</b>	Number of patients undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure.	Outcome: Survival of patients who undergo an AVR procedure.  Time Window = during the hospital admission
<b>Population</b>	All patients undergoing isolated AVR surgery	Included Population: All hospital patients who had an AVR procedure.  Time Window = 12 months
<b>Exclusions</b>	Patients <20 years Patients receiving CABG or other valve or cardiac surgery during this admission	none
<b>Methods &amp; Risk Adjustment</b>	Risk adjustment: Multivariate logistic regression and hierarchical modeling Risk Adjustment Variables Afib Age Function 1 max(age-50,0) Age Function 3 max(age-75,0) Age x Reop Function Age x Status Function Age x MVR Function Age x MVRRepair Function BSAFunction 1 ( BSA Function 2 CHF but not NYHA IV CHF and NYHA IV CLD Function CLD x MVR Function CLD x MVRRepair Function Creatinine Function 1	Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].  Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-

	NQF Endorsed Measure# 0120	New Measure# HOE-022-08
	Diabetes - Noninsulin Diabetes - Insulin Diabetes x MVR Function Dialysis Dialysis x MVR Function Dialysis x MVRRepair Function Ejection Fraction Function Endocarditis - Active Female Female x MVR Function Female x MVRRepair Function Female x BSA Function 1 Female x BSA Function 2 Hypertension IABP or Inotropes Immunosuppressive Treatment Left Main Disease MI <= 21 days MVR MVRRepair PVD Reop - 1 Previous Operation Reop - >=2Previous Operations Shock Status - Urgent Status - Emergent Status - Salvage Status x MVR Function Status x MVRRepair Function Stenosis - Mitral Unstable Angina	<p>adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing AVR surgeries (thus, it includes all AVR surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all AVRs performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is also the group of AVR cases, the data needed for this domain is the number of observed deaths occurring for AVR cases, within the inpatient setting.</p> <p>The general composite measure calculation is as follows:            Predicted Survival = 1-Predicted Mortality</p> <p>Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)</p> <p>Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure, or can be derived from claims data).            *Any negative values are reset to "0"</p> <p>Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).</p>
<b>Outcome Details/Codes</b>		For the observed mortality, the hospital submits the observed deaths for AVR cases as identified using the denominator codes
<b>Population Details/Codes</b>		For the volume predicted mortality and the observed mortality, hospitals count the number of all AVR cases using the following codes.  ICD-9-CM Procedure Codes for AVR 35.21 Replacement of aortic valve with tissue graft 35.22 Other replacement of aortic valve
<b>Exclusion Details/Codes</b>		none
<b>Data Source</b>	Electronic Clinical Database	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)

	<b>NQF Endorsed Measure# 0120</b>	<b>New Measure# HOE-022-08</b>
<b>Setting</b>	Hospital	Hospital

## AAA Mortality – NQF#0359, HOE-021

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0359	New Measure# HOE-021-08
<b>Title</b>	Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11) (risk adjusted)	Survival Predictor for Abdominal Aortic Aneurysm (AAA)©
<b>Status</b>	Endorsed 5/15/2008	Recommended by SC 3/4/2009
<b>Steward</b>	Agency for Healthcare Research and Quality	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>• Mortality</li> <li>• Claims data – patient level</li> <li>• Risk adjusted using claims data</li> <li>• Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality; steward notes this measure does not prevent reporting for low numbers – confidentiality rules restrict reporting when low number of cases</li> <li>• Confidence interval computed</li> <li>• Suggest reporting both volume and mortality</li> <li>• AHRQ does not publicly hospital scores; some states do require hospital identifiers and report measure scores</li> </ul>	<ul style="list-style-type: none"> <li>• Survival</li> <li>• Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>• No risk adjustment</li> <li>• Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>• No confidence interval, just a point estimate</li> <li>• Steward states that this approach takes volume (experience) into account in one measure</li> <li>• Specifications not harmonized, e.g., excludes ruptured aneurysm</li> <li>• Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive / Additive Value</b>	NQF-endorsed measure	<ul style="list-style-type: none"> <li>• Useful if claims data with hospital identifiers not accessible and hospitals agree to report</li> <li>• Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	Number of deaths per 100 AAA repairs (risk adjusted).	A reliability adjusted measure of AAA repair performance that optimally combines two important domains: AAA hospital volume and AAA operative mortality, to provide predictions on AAA survival rates for hospitals.
<b>Outcome</b>	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Outcome: Survival rate for patients without AAA rupture who undergo an AAA repair.  Time Window = during the hospital admission
<b>Population</b>	Discharges, age 18 years and older, with ICD-9-CM codes of 3834, 3844, 3864, or 3971 in any procedure field AND a diagnosis of AAA in any field.	Included Population: All hospital patients without rupture who had an AAA repair.  Time Window = 12 months
<b>Exclusions</b>	<ul style="list-style-type: none"> <li>• missing discharge disposition (DISP=missing)</li> <li>• transferring to another short-term hospital (DISP=2)</li> <li>• MDC 14 (pregnancy, childbirth, and puerperium)</li> <li>• MDC 15 (newborns and other neonates)</li> </ul>	Patients with ruptured aneurysm
<b>Methods &amp; Risk Adjustment</b>	The Risk Adjustment and Hierarchical Modeling (RAHM) Workgroup recommended that the AHRQ adopt a hierarchical modeling approach with the AHRQ QI. The parameter file of risk adjustment covariates is computed using a hospital random-effect instead of a simple logistic model ( <a href="http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13">http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13</a> ). The purpose of the QI statistical risk models is to provide parameter estimates for each quality indicator that are adjusted for age, gender, and all patient refined diagnosis related group (APR-DRG). The APR-DRG classification methodology was developed by 3M, and provides a basis to adjust the QIs for the	Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information

	<b>NQF Endorsed Measure# 0359</b>	<b>New Measure# HOE-021-08</b>
	<p>severity of illness or risk of mortality, and is explained elsewhere.</p> <p>Risk adjustment factors: sex age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+ each age category*female ADRG 1731 (other vascular procedures-minor) ADRG 1732 (other vascular procedures-moderate) ADRG 1733 (other vascular procedures-major) ADRG 1734 (other vascular procedures-extreme) ADRG 1691 (major thoracic and abdominal vascular procedures-minor) ADRG 1692 (major thoracic and abdominal vascular procedures-moderate) ADRG 1693 (major thoracic and abdominal vascular procedures-major) ADRG 1694 (major thoracic and abdominal vascular procedures-extreme) ADRG 9999 (other)</p>	<p>regarding hospital volume [volume-predicted mortality].</p> <p>Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing AAA surgeries (thus, it includes all AAA surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all AAAs performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is the group of AAA cases without rupture, the data needed for this domain is the number of observed deaths occurring for AAA cases without rupture, within the inpatient setting.</p> <p>The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality</p> <p>Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)</p> <p>Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure, or can be derived from claims data). *Any negative values are reset to "0"</p> <p>Weight = mortality signal/ (mortality signal + [mortality sigma/ caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).</p>
<b>Outcome Details/Codes</b>		For the observed mortality, the hospital submits the observed deaths for AAA cases in patients without rupture as identified using the denominator and exclusion codes
<b>Population Details/Codes</b>	<p>ICD-9-CM AAA repair procedure codes: 3834 AORTA RESECTION &amp; ANAST 3844 RESECT ABDOM AORTA W REPL 3864 EXCISION OF AORTA 3971 ENDO IMPLANT OF GRAFT IN AORTA ICD-9-CM AAA diagnosis codes: 4413 RUPT ABD AORTIC ANEURYSM 4414 ABDOM AORTIC ANEURYSM</p>	<p>For the volume predicted mortality, hospitals count the number of all AAA repair cases using the following procedure codes.</p> <p>ICD-9-CM Procedure Codes for AAA repair 3834 Aorta Resection &amp; Anast 3844 Resection Abdominal Aorta with replacement 3864 Excision of aorta</p>

	NQF Endorsed Measure# 0359	New Measure# HOE-021-08
		3925 Aorta-iliac-femoral bypass 3971 Endo Implant of Graft in Aorta  For the observed mortality hospitals count the number of AAA repair cases that also have a diagnosis of unruptured AAA using the following codes.  ICD-9CM Codes for AAA without rupture 441.4 Dissection of aorta aneurysm unspecified site 441.7 Thoracoabdominal aneurysm without rupture 441.9 Aortic aneurysm of unspecified site without rupture
<b>Exclusion Details/Codes</b>		For the count of all AAA procedures exclude: 3845 Thoracoabdominal procedures  For the observed mortality domain, exclude all Thoracic Diagnosis Codes and dissection codes for AAA 441.0x General code 441.1 Thoracic aneurysm ruptured 441.2 Thoracic aneurysm without rupture 441.3 Abdominal aneurysm ruptured 441.5 Aortic aneurysm of unspecified site ruptured 441.6 Thoracoabdominal aneurysm ruptured
<b>Data Source</b>	Electronic Claims	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)
<b>Setting</b>	Hospital	Hospital

## Esophageal Resection Mortality – NQF#0360, HOE-023

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0360	New Measure# HOE-023-08
<b>Title</b>	Esophageal Resection Mortality Rate (IQI 8) (risk adjusted)	Survival Predictor for Esophagectomy Surgery©
<b>Status</b>	Endorsed 5/15/2008	Recommended by SC 3/4/2009
<b>Steward</b>	Agency for Healthcare Research and Quality	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>• Mortality</li> <li>• Claims data – patient level</li> <li>• Risk adjusted using claims data</li> <li>• Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality; steward notes this measure does not prevent reporting for low numbers – confidentiality rules restrict reporting when low number of cases</li> <li>• Confidence interval computed</li> <li>• Suggest reporting both volume and mortality</li> <li>• AHRQ does not publicly hospital scores; some states do require hospital identifiers and report measure scores</li> </ul>	<ul style="list-style-type: none"> <li>• Survival</li> <li>• Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>• No risk adjustment</li> <li>• Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>• No confidence interval, just a point estimate</li> <li>• Steward states that this approach takes volume (experience) into account in one measure</li> <li>• Specifications not harmonized, e.g., does not include all codes for esophageal procedures, includes total gastrectomy</li> <li>• Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive / Additive Value</b>	NQF-endorsed measure	<ul style="list-style-type: none"> <li>• Useful if claims data with hospital identifiers not accessible and hospitals agree to report</li> <li>• Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	Number of deaths per 100 esophageal resections for cancer (risk adjusted).	A reliability adjusted measure of Esophagectomy surgical performance that optimally combines two important domains: Esophagectomy hospital volume and Esophagectomy operative mortality, to provide predictions on Esophagectomy survival rates for hospitals.
<b>Outcome</b>	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Outcome: Survival of esophageal cancer patients who undergo an esophagectomy  Time Window = during the hospital admission
<b>Population</b>	Discharges, age 18 years and older, with ICD-9-CM codes for esophageal resection in any procedure field AND a diagnosis code of esophageal cancer in any field	Included Population: All hospital patients with esophageal cancer who had an esophagectomy.  Time Window = 12 months
<b>Exclusions</b>	<ul style="list-style-type: none"> <li>• missing discharge disposition (DISP=missing)</li> <li>• transferring to another short-term hospital (DISP=2)</li> <li>• MDC 14 (pregnancy, childbirth, and puerperium)</li> <li>• MDC 15 (newborns and other neonates)</li> </ul>	Patients without a diagnosis of esophageal cancer
<b>Methods &amp; Risk Adjustment</b>	The Risk Adjustment and Hierarchical Modeling (RAHM) Workgroup recommended that the AHRQ adopt a hierarchical modeling approach with the AHRQ QI. The parameter file of risk adjustment covariates is computed using a hospital random-effect instead of a simple logistic model ( <a href="http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13">http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13</a> ). The purpose of the QI statistical risk models is to provide parameter estimates for each quality indicator that are adjusted for age, gender, and all patient refined diagnosis related group (APR-DRG). The	Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality

	<b>NQF Endorsed Measure# 0360</b>	<b>New Measure# HOE-023-08</b>
	<p>APR-DRG classification methodology was developed by 3M, and provides a basis to adjust the QIs for the severity of illness or risk of mortality, and is explained elsewhere.</p> <p>Risk adjustment factors: sex  age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+  each age category*female  ADRG 2201-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MINOR)  ADRG 2202-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MODERATE)  ADRG 2203-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MAJOR)  ADRG 2204-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (EXTREME)  ADRG 9999 (OTHER)</p>	<p>rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].</p> <p>Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing Esophagectomy surgeries (thus, it includes all Esophagectomy surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all Esophagectomys performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is narrowed to a homogenous group of esophagectomy with a diagnosis of cancer, the data needed for this domain is the number of observed deaths occurring for esophagectomy cases with cancer, within the inpatient setting.</p> <p>The general composite measure calculation is as follows:  Predicted Survival = 1-Predicted Mortality</p> <p>Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)</p> <p>Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure, or can be derived from claims data).  *Any negative values are reset to "0"</p> <p>Weight = mortality signal/ (mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).</p>
<b>Outcome Details/Codes</b>		For the observed mortality, the hospital submits the observed deaths for esophagectomy cases in patients with esophageal cancer as identified using the denominator codes
<b>Population Details/Codes</b>	ICD-9-CM esophageal resection procedure code: 424 ESOPHAGECTOMY 4240 ESOPHAGECTOMY NOS 4241 PARTIAL ESOPHAGECTOMY 4242 TOTAL ESOPHAGECTOMY	For the volume predicted mortality, hospitals count the number of esophagectomy cases using the following codes.  ICD-9-CM Procedure Codes for Esophagectomy

	<b>NQF Endorsed Measure# 0360</b>	<b>New Measure# HOE-023-08</b>
	425 THORAC ESOPHAG ANAST 4251 THORAC ESOPHAGUESOPHAGOS 4252 THORAC ESOPHAGOGASTROST 4253 THORAC SM BOWEL INTERPOS 4254 THORAC ESOPHAGOENTER NEC 4255 THORAC LG BOWEL INTERPOS 4256 THORAC ESOPHAGOCOLOS NEC 4258 THORAC INTERPOSITION NEC 4259 THORAC ESOPHAG ANAST NEC 426 STERN ESOPHAG ANAST 4261 STERN ESOPHAGUESOPHAGOST 4262 STERN ESOPHAGOGASTROSTOM 4263 STERN SM BOWEL INTERPOS 4264 STERN ESOPHAGOENTER NEC 4265 STERN LG BOWEL INTERPOS 4266 STERN ESOPHAGOCOLOS NEC 4268 STERN INTERPOSITION NEC 4269 STERN ESOPHAG ANAST NEC  ICD-9-CM esophageal cancer diagnosis codes: 1500 MAL NEO CERVICAL ESOPHAG 1501 MAL NEO THORACIC ESOPHAG 1502 MAL NEO ABDOMIN ESOPHAG 1503 MAL NEO UPPER 3RD ESOPH 1504 MAL NEO MIDDLE 3RD ESOPH 1505 MAL NEO LOWER 3RD ESOPH 1508 MAL NEO ESOPHAGUS NEC 1509 MAL NEO ESOPHAGUS NOS	424 Esophagectomy 4240 Esophagectomy NOS 4241 Partial Esophagectomy 4242 Total Esophagectomy 4399 Total gastrectomy NEC  For the observed mortality hospitals count the number of esophagectomy cases that also have an esophageal cancer diagnosis using the following codes.  ICD-9-CM Codes for Esophageal Cancer 1500 MAL NEO CERVICAL ESOPHAG 1501 MAL NEO THORACIC ESOPHAG 1502 MAL NEO ABDOMIN ESOPHAG 1503 MAL NEO UPPER 3RD ESOPH 1504 MAL NEO MIDDLE 3RD ESOPH 1505 MAL NEO LOWER 3RD ESOPH 1508 MAL NEO ESOPHAGUS NEC 1509 MAL NEO ESOPHAGUS NOS
<b>Exclusion Details/Codes</b>		Esophagectomy cases without an esophageal cancer diagnosis code
<b>Data Source</b>	Electronic Claims	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)
<b>Setting</b>	Hospital	Hospital

## Pancreatic Resection Mortality – NQF#0365, HOE-024

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0365	New Measure# HOE-024-08
<b>Title</b>	Pancreatic Resection Mortality Rate (IQI 9) (risk adjusted)	Survival Predictor for Pancreatic Resection Surgery©
<b>Status</b>	Endorsed 5/15/2008	Recommended by SC 3/4/2009
<b>Steward</b>	Agency for Healthcare Research and Quality	Leapfrog Group
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>• Mortality</li> <li>• Claims data – patient level</li> <li>• Risk adjusted using claims data</li> <li>• Hierarchical regression model addresses small case volume by placing more emphasis on the overall mean mortality for the hospitals than the provider-specific mortality; steward notes this measure does not prevent reporting for low numbers – confidentiality rules restrict reporting when low number of cases</li> <li>• Confidence interval computed</li> <li>• Suggest reporting both volume and mortality</li> <li>• AHRQ does not publicly hospital scores; some states do require hospital identifiers and report measure scores</li> </ul>	<ul style="list-style-type: none"> <li>• Survival</li> <li>• Hospital reports aggregate totals based on its claims data; could be used with patient-level claims data</li> <li>• No risk adjustment</li> <li>• Uses a different Bayes approach to address small case volume by placing more emphasis on a volume-predicted mortality than the provider-specific mortality</li> <li>• No confidence interval, just a point estimate</li> <li>• Steward states that this approach takes volume (experience) into account in one measure</li> <li>• Specifications not harmonized, e.g., different codes for pancreatic resection, includes more than cancer diagnoses than pancreatic</li> <li>• Leapfrog Group intends to publicly report for hospitals that participate</li> </ul>
<b>Distinctive / Additive Value</b>	NQF-endorsed measure	<ul style="list-style-type: none"> <li>• Useful if claims data with hospital identifiers not accessible and hospitals agree to report</li> <li>• Steward indicates provides more reliable predictor for small case volume</li> </ul>
<b>Description</b>	Number of deaths per 100 pancreatic resections for cancer (risk adjusted).	A reliability adjusted measure of pancreatic resection surgical performance that optimally combines two important domains: Pancreatic resection hospital volume and pancreatic operative mortality, to provide predictions on pancreatic survival rates for hospitals.
<b>Outcome</b>	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Outcome: Survival of pancreatic cancer patients who undergo a pancreatic resection  Time Window = during the hospital admission
<b>Population</b>	Discharges with ICD-9-CM codes of 526 or 527 in any procedure field AND a diagnosis code of pancreatic cancer in any field	Included Population: All hospital patients with pancreatic cancer who had a pancreatic resection.  Time Window = 12 months
<b>Exclusions</b>	<ul style="list-style-type: none"> <li>• missing discharge disposition (DISP=missing)</li> <li>• transferring to another short-term hospital (DISP=2)</li> <li>• MDC 14 (pregnancy, childbirth, and puerperium)</li> <li>• MDC 15 (newborns and other neonates)</li> </ul>	Patients who do not have a diagnosis of pancreatic cancer
<b>Methods &amp; Risk Adjustment</b>	The Risk Adjustment and Hierarchical Modeling (RAHM) Workgroup recommended that the AHRQ adopt a hierarchical modeling approach with the AHRQ QI. The parameter file of risk adjustment covariates is computed using a hospital random-effect instead of a simple logistic model ( <a href="http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13">http://www.qualityindicators.ahrq.gov/listserv_archive_2006.htm#Oct13</a> ). The purpose of the QI statistical risk models is to provide parameter estimates for each quality indicator that are adjusted for age, gender, and all patient refined diagnosis related group (APR-DRG). The APR-DRG classification methodology was developed by	Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital – we refer to this as the “volume-predicted mortality”. With this approach, the observed mortality rate is weighted according to how reliably it is estimated,

	NQF Endorsed Measure# 0365	New Measure# HOE-024-08
	<p>3M, and provides a basis to adjust the QIs for the severity of illness or risk of mortality, and is explained elsewhere.</p> <p>Risk adjustment factors: sex age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+ each age category*female</p> <p>ADRG 2201-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MINOR) ADRG 2202-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MODERATE) ADRG 2203-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (MAJOR) ADRG 2204-MAJOR STOMACH, ESOPHAGEAL &amp; DUODENAL PROCEDURES (EXTREME) ADRG 2601-PANCREAS, LIVER &amp; SHUNT PROCEDURES (MINOR) ADRG 2602-PANCREAS, LIVER &amp; SHUNT PROCEDURES (MODERATE) ADRG 2603-PANCREAS, LIVER &amp; SHUNT PROCEDURES (MAJOR) ADRG 2604-PANCREAS, LIVER &amp; SHUNT PROCEDURES (EXTREME) ADRG 9999 (OTHER)</p>	<p>with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].</p> <p>Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance.</p> <p>The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate.</p> <p>The volume predicted mortality rate reflects the hospitals experience performing pancreatic resection surgeries (thus, it includes all pancreatic resection surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all pancreatic resections performed in the hospital.</p> <p>The second domain is the observed mortality, for this domain the population is narrowed to a homogenous group of pancreatic resections with a diagnosis of cancer, the data needed for this domain is the number of observed deaths occurring for pancreatic resection cases with cancer, within the inpatient setting.</p> <p>The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality</p> <p>Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)</p> <p>Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for this high-risk procedure; or can be derived from claims data). *Any negative values are reset to "0"</p> <p>Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #2 for this high-risk procedure; or can be derived from claims data).</p>
<b>Outcome Details/Codes</b>		For the observed mortality, the hospital submits the observed deaths for pancreatic resection cases in patients with pancreatic cancer as identified using the denominator codes
<b>Population Details/Codes</b>	<p>ICD-9-CM pancreatic resection procedure codes: 526 TOTAL PANCREATECTOMY 527 RAD PANCREATOCODUODENECT</p> <p>ICD-9-CM pancreatic cancer diagnosis codes: 1520 MALIGNANT NEOPL DUODENUM 1561 MAL NEO EXTRAHEPAT DUCTS</p>	<p>For the volume predicted mortality, hospitals count the number of all pancreatic resection cases using the following codes.</p> <p>ICD-9-CM Procedure Codes for Pancreatectomy Any pancreaticoduodenectomy:</p>

	<b>NQF Endorsed Measure# 0365</b>	<b>New Measure# HOE-024-08</b>
	1562 MAL NEO AMPULLA OF VATER 1574 MAL NEO ISLET LANGERHANS 1570 MAL NEO PANCREAS HEAD 1571 MAL NEO PANCREAS BODY 1572 MAL NEO PANCREAS TAIL 1573 MAL NEO PANCREATIC DUCT 1578 MALIG NEO PANCREAS NEC 1579 MALIG NEO PANCREAS NOS	5251 Proximal Pancreatectomy 5253 Radical Subtot Pancreatectomy 526 Total Pancreatectomy 527 Radical Pancreatectomy  For the observed mortality, the hospital counts the number of pancreatic resection cases that also have a pancreatic cancer diagnosis using the following codes  ICD-9-CM Codes for pancreatic cancer 1520 MALIGNANT NEOPL OF DUODENUM 1521 MALIGNANT NEOPL JEJUNUM 1522 MALIGNANT NEOPLASM ILEUM 1523 MAL NEO MECKEL'S DIVERT 1528 MAL NEO SMALL BOWEL NEC 1529 MAL NEO SMALL BOWEL NOS 1560 MALIG NEO GALLBLADDER 1561 MAL NEO EXTRAHEPAT DUCTS 1562 MAL NEO AMPULLA OF VATER 1568 MALIG NEO BILIARY NEC 1569 MALIG NEO BILIARY NOS 1570 MAL NEO PANCREAS HEAD 1571 MAL NEO PANCREAS BODY 1572 MAL NEO PANCREAS TAIL 1573 MAL NEO PANCREATIC DUCT 1574 MAL NEO ISLET LANGERHANS 1578 MALIG NEO PANCREAS NEC 1579 MALIG NEO PANCREAS NOS
<b>Exclusion Details/Codes</b>		Pancreatectomy cases without a pancreatic cancer diagnosis code
<b>Data Source</b>	Electronic Claims	Coefficients from the NIS, Electronic Claims (Leapfrog Hospital Survey)
<b>Level</b>	Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)
<b>Setting</b>	Hospital	Hospital

## HF Readmission – NQF#0330, HOE-004

### Comparison of Recommended New Measure to Similar Endorsed Measures

	NQF Endorsed Measure# 0330	New Measure# HOE-004-08
<b>Title</b>	30-Day All-Cause Risk Standardized Readmission Rate Following Heart Failure Hospitalization (risk adjusted)	Risk-Adjusted 30-Day Readmission Rate for Heart Failure©
<b>Status</b>	Endorsed 5/15/2008	Recommended by SC 3/4/2009
<b>Steward</b>	Centers for Medicare and Medicaid Services	Health Benchmarks, Inc
<b>Differences / Harmonization</b>	<ul style="list-style-type: none"> <li>Developed/tested with Medicare fee-for-service claims data (includes 80% of all hospitalized heart failure patients).</li> <li>Steward indicates could be applied to all payer data if available with possibly some model calibration.</li> <li>Risk model includes only factors present at start of admission (e.g., not at discharge)</li> <li>Excludes if hospice admission 12 mo prior and up to 1<sup>st</sup> day of admission.</li> </ul>	<ul style="list-style-type: none"> <li>Intended for use with health plan claims data - Are there enough cases of &lt;65 HF patients to aggregate and report data at the hospital level?</li> <li>Steward indicated tried to use endorsed measure methodology with health plan data, but not all details currently publicly available, also wanted fewer risk factors</li> <li>Risk model includes discharge to nursing home, which occurs after care is rendered (not consistent with NQF criteria that risk factors should be present at the start of care).</li> <li>Excludes hospice admission up to 30 days after discharge (also factor that occurs after care provided).</li> <li>Not harmonized on some key aspects noted above</li> </ul>
<b>Distinctive / Additive Value</b>	<ul style="list-style-type: none"> <li>NQF-endorsed measure</li> </ul>	<ul style="list-style-type: none"> <li>Useful if endorsed measure not accessible for implementation in other non-Medicare data sets; however, needs better harmonization &amp; alignment w/NQF criteria re: risk factors and exclusions, differences are likely to affect comparability and interpretability of measure scores</li> </ul>
<b>Description</b>	Hospital-specific, risk-standardized, 30-day all-cause readmission rates for Medicare fee-for-service patients discharged from the hospital with a principal diagnosis of heart failure (HF).	Assesses the risk-adjusted 30-day readmission rates for patients discharged with heart failure during the measurement year.
<b>Outcome</b>	<p>Measured outcome: 30-day all-cause readmissions to any hospital for patients discharged from the hospital with a principal diagnosis of HF, as measured from the date of discharge of the index HF admission</p> <p>Time Window: within 30 days after discharge</p>	<p>Members readmitted to the hospital 2-30 days after the index date.</p> <p>Note: Index date is defined as the date of discharge from an inpatient setting with congestive heart failure (date of denominator criteria A)</p> <p>Time Window: 2-30 days after the date of discharge</p>
<b>Population</b>	Included population: Index admissions for Medicare fee-for-service beneficiaries age 65 or over admitted to the hospital with a principal ICD-9-CM discharge diagnosis of heart failure and discharged alive	<p>Members who were discharged from an inpatient setting with congestive heart failure during the 1 year period ending 30 days prior to the end of the measurement year.</p> <p>Time Window: One year period ending 30 days prior to the end of the measurement year.</p>
<b>Exclusions</b>	<p>Age &lt;65</p> <p>In-hospital deaths</p> <p>Incomplete data (without FFS Part A, without 12 mo enrollment prior to discharge, without 1 month enrollment post discharge)</p> <p>Transfers out</p> <p>Additional HF admissions within 30 days</p>	<p>Members in hospice during the 356 days prior to the index date through 30 days after the index date, or members who expired.</p> <p>Note: Index date is defined as the date of discharge from an inpatient setting with congestive heart failure (date of denominator criteria A)</p>
<b>Methods &amp; Risk Adjustment</b>	Method: Hierarchical logistic regression model We calculate hospital-specific readmission rates as the ratio of predicted to expected readmissions, multiplied by the national unadjusted rate. The expected number of	Model: Because of natural clustering of the observations within hospitals, we used hierarchical generalized linear models (logit link function). We modeled the probability of readmission 2-30 days after discharge as a function of

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	<p>readmissions in each hospital is estimated using its patient mix and the average hospital-specific intercept. The predicted number of readmissions in each hospital is estimated given the same patient mix but the hospital-specific intercept. Operationally, the expected number of readmissions for each hospital is obtained by regressing the risk factors on the readmission using all hospitals in our sample, applying the subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, summing over all patients in the hospital, and then transforming to get a count. This is a form of indirect standardization. The predicted hospital outcome is the number of expected readmissions in the "specific" hospital and not at a reference hospital. Operationally this is accomplished by estimating a hospital-specific intercept that represented baseline readmission risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, summing over all patients in the hospital, and then transforming to get a count. To assess hospital performance in any given year, we re-estimate the model coefficients using that year's data.</p> <p>Risk Adjustment Variables from claims data 12 mo prior to index admission include:  Age-65 (years above 65, continuous)  Male  History of CABG  Congestive heart failure  Acute coronary syndrome  Arrhythmias Cardio-respiratory failure and shock  Valvular and rheumatic heart disease  Vascular or circulatory disease  Chronic atherosclerosis  Other and unspecified heart disease  Hemiplegia, paraplegia, paralysis, functional disability  Stroke  Renal failure  COPD  Diabetes and DM complications  Disorders of fluid/electrolyte/acid-base  Other urinary tract disorders  Decubitus ulcer or chronic skin ulcer  Other gastrointestinal disorders  Peptic ulcer, hemorrhage, other specified gastrointestinal disorders  Severe hematological disorders  Nephritis  Dementia and senility  Metastatic cancer and acute leukemia  Cancer  Liver and biliary disease  End-stage renal disease or dialysis  Asthma  Iron deficiency and other/unspecified anemias and blood disease  Pneumonia  Drug/alcohol abuse/dependence/psychosis</p>	<p>patient demographic and clinical characteristics and a random hospital specific effect (random intercept model)  Risk Adjustment Variables from claims data ?? mo prior to index date:  (1) Age, Age-squared  (2) gender (male vs female)  (3) History of congestive heart failure hospitalization in the past year (1 year prior to index date, excluding index date)  ICD-9 diagnosis code(s): 398.91, 402.x1, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.xx  AND  Inpatient setting: CPT-4 code(s): 99238-99239  (4) chronic renal disease (i.e., stage &gt;= 3 or dialyses) (1 year prior to index date, including index date)  ICD-9 diagnosis codes:250.4x, 274.1x, 403.01, 403.11, 403.90, 403.91, 404.02, 404.03, 404.10, 404.11, 404.12, 404.13, 404.90, 404.91, 404.92, 404.93, 581.xx, 582.xx, 583.xx, 585.3-585.5, 586, 587, 753.0, 753.10, 753.11, 753.12, 753.13, 753.14, 753.15, 753.16, 753.17, 753.19  DRG code(s): 316  Dialysis:  ICD-9 diagnosis codes: 38.95, 39.27, 39.42, 39.93, 39.95, 54.98, V45.1, V56.0, V56.1, V56.2, V56.31, V56.32, V56.8, E879.1  ICD-9 surgical proc codes: 38.95, 39.27, 39.42, 39.93, 39.95, 54.98  DRG code: 317  CPT codes: 0505F, 0507F, 3066F, 3082F-3084F, 4051F-4055F, 36800, 36810, 36815, 36818-36821, 36825, 36831-38633, 90920, 90921, 90924, 90925, 90935, 90937, 90939, 90940, 90945, 90947, 90989, 90993, 90997, 90999, 99512, G0257, G0314-G0319, G0322, G0323, G0326, G0327, G9013, G9014  UB revenue code(s): 0800-0809, 0820-0859, 0880, 0881, 0882, 0889  HCPCS codes: A4653, A4671-A4918, E1500-E1699  (5) coronary artery disease (1 year prior to index date, including index date)  AMI:  ICD-9 diagnosis code: 410.x1  DRG codes: 121, 122, 516  PTCA:  ICD-9 surgical proc codes: 00.66, 36.01, 36.02, 36.05, 36.06, 36.07, 36.09  CPT-4 codes: 33140, 92980-92982, 92984, 92995, 92996  DRG codes: 516, 517, 526, 527, 555-558</p>

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	<p>Major psych disorders            Depression            Other psychiatric disorders            Fibrosis of lung and other chronic lung disorders            Protein-calorie malnutritio</p>	<p>CABG            ICD-9 surgical proc codes: 36.1x, 36.2x            HCPCS codes: S2205-S2209            CPT-4 codes: 33510-33514, 33516-33519, 33521-33523, 33533-33536, 35600, 33572            DRG codes: 106, 107, 109, 547-550</p> <p>Other forms of Ischemic Heart Disease:            ICD-9 diagnosis codes: 414.0x, 414.8x, 414.9x , 429.2</p> <p>Stable Angina:            ICD-9 diagnosis codes: 411.xx, 413.x</p> <p>(6) pacemaker insertion (1 year prior to index date, including index date)            CPT codes: 00530, 33226-33240, 33249</p> <p>(7) COPD (1 year prior to index date, including index date)            ICD-9 diagnosis codes: 492.x, 506.4, 518.1, 518.2</p> <p>(8) discharge to nursing home (1-30 days after index date)            CPT-4 codes: 99304-99316, 99318, 99324-99340</p> <p>(9) Modified Elixhauser Comorbidity Index (codes downloaded from website below; used all claims from 0-365 days prior to index date)that exclude congestive heart failure, chronic pulmonary disease, and renal failure).  <a href="http://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp#download">http://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp#download</a></p>
<b>Outcome Details/Codes</b>	<p>Admissions that occur within 30 days of discharge from an index admission. If a patient has one or more additional HF admissions within 30 days of discharge from an index HF admission, we do not consider the additional HF admissions as index admissions (they are considered as potential readmissions). Thus, any HF admission is either an index admission or a readmission, but not both.</p> <p>Deaths that occur at home within the 30-day period are considered a "zero" readmission.</p>	<p>Numerator Logic : A only</p> <p>[A] Members readmitted 2-30 days after the index date</p> <p>Inpatient setting:            CPT-4 codes: 99221-99223, 99261-99263, 99291-99300</p>
<b>Population Details/Codes</b>	<p>An "index admission" is one in which we evaluate the 30 days after discharge for a readmission.            Heart failure ICD-9-CM codes:            402.01 Malignant hypertensive heart disease with congestive heart failure (CHF)            402.11 Benign hypertensive heart disease with CHF            402.91 Hypertensive heart disease with CHF            404.01 Malignant hypertensive heart and renal disease with CHF            404.03 Malignant hypertensive heart and renal disease with CHF &amp; renal failure (RF)            404.11 Benign hypertensive heart and renal disease with CHF            404.13 Benign hypertensive heart and renal disease with CHF &amp; RF            404.91 Unspecified hypertensive heart and renal disease</p>	<p>Denominator Logic: DEMO and CE and A</p> <p>[DEMO] Members ages 19 years and older by end of the measurement year</p> <p>[CE] Members who are continuously enrolled during the 365 days prior to the index date through 30 days after index date.</p> <p>Note: Index date is defined as the date of discharge from an inpatient setting with congestive heart failure (date of denominator criteria A)</p> <p>[A] Members who were discharged from an inpatient setting with congestive heart failure (CHF) during the 1 year period ending 30 days prior to the end of the</p>

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	with CHF 404.93 Hypertension and non-specified heart and renal disease with CHF & RF 428.xx Heart failure codes	measurement year.  CHF: ICD-9 diagnosis codes: 398.91, 402.x1, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.xx AND Inpatient setting: CPT-4 codes: 99238-99239
<b>Exclusion Details/Codes</b>	<p>The following hospitalizations are excluded as index admissions</p> <p>Age &lt;65</p> <p>In-hospital deaths</p> <p>Incomplete data - the measure excludes HF admissions for:</p> <p>a. Beneficiaries without FFS Medicare Part A at the time of the index admission;</p> <p>b. Beneficiaries without 12 full months of enrollment in parts A and B FFS prior to the index admission;</p> <p>c. Beneficiaries without one full month of enrollment in Parts A and B FFS post discharge.</p> <p>Transfers-out. Admissions for patients having a principal diagnosis during the index hospitalization and subsequently transferred to an acute care setting.</p> <p>Additional HF admissions within 30 days. If a patient has one or more additional HF admissions within 30 days of discharge from an index HF admission, we do not consider the additional HF admissions as index admissions (they are considered as potential readmissions). Thus, any HF admission is either an index admission or a readmission, but not both.</p> <p>Patients enrolled in the Medicare hospice program any time in the 12 months prior to the index hospitalization including the first day of the index admission</p>	<p>Denominator Exclusion Logic: A or B</p> <p>[A] Members in hospice during the 365 days prior to the index date through 30 days after index date.</p> <p>Note: Index date is defined as the date of discharge from an inpatient setting with congestive heart failure (date of denominator criteria A)</p> <p>ICD-9 diagnosis code: V66.7 CPT-4 codes: 99376*, 99377, 99378 HCPCS codes: G0065*, G0182, G0337, Q5001-Q5009, S0271, S9126, T2042-T2046 UB revenue codes: 115, 125, 135, 145, 155, 235, 650-652, 655-659, 0115, 0125, 0135, 0145, 0155, 0235, 0650-0652, 0655-0659 UB type of bill codes: 81x, 82x Place of service code: 34</p> <p>* Codes is retired but appropriate for retrospective analysis.</p> <p>[B] Members whose discharge status is 'expired' on the index date</p> <p>Note: Index date is defined as the date of discharge from an inpatient setting with congestive heart failure (date of denominator criteria A)</p> <p>Note: codes for discharge status "expired" will vary by plan.</p>
<b>Data Source</b>	Electronic Claims – Medicare Medicare enrollment data	Electronic Claims – Healthplan; Other - Member demographics and member enrollment data
<b>Level</b>	Facility (e.g., hospital, nursing home)	Individual clinician (physician, nurse), Health Plan, Group of clinicians (facility, dept/unit, group), Facility (e.g., hospital, nursing home), Integrated delivery system
<b>Setting</b>	Hospital	Hospital, Health Plan