



Measure Information - Composite

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item 1b.1 relates to subcriterion 1b).

Brief Measure Information

NQF #: 0704

De.2. Measure Title: Proportion of Patients Hospitalized with AMI that have a Potentially Avoidable Complication (during the Index Stay or in the 30-day Post-Discharge Period)

Co.1.1. Measure Steward: Health Care Incentives Improvement Institute Inc. (HCII)

De.3. Brief Description of Measure: Percent of adult population aged 18 + years who are admitted to a hospital with acute myocardial infarction (AMI), are followed for one-month after discharge, and have one or more potentially avoidable complications (PACs). PACs may occur during the index stay or during the 30-day post discharge period. Please reference attached document labeled NQF_AMI_all_codes_risk_adjustment_06.30.15.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to AMI.

We define PACs during each time period as one of two types:

(A) PACs during the Index Stay (Hospitalization):

(1) Type 1 PACs - PACs directly related to the index condition: The index stay period is regarded as having a PAC if during the index hospitalization the patient develops one or more complications directly related to AMI or its management. Examples of these PACs are cardiac arrest, ventricular fibrillation, cardiogenic shock, stroke, coma, acute post- hemorrhagic anemia etc.

(2) Type 2 PACs - PACs suggesting Patient Safety Failures: The index stay period is also regarded as having a PAC if there are one or more complications related to patient safety issues. Examples of these PACs are septicemia, other infections, phlebitis, deep vein thrombosis, pulmonary embolism, pressure sores or any of the CMS-defined hospital acquired conditions (HACs).

(B) PACs during the 30-day post discharge period:

(1) Type 1 PACs - PACs directly related to the index condition: Patients are also considered to have a PAC, if they have a readmission or receive other services during the 30-day post discharge period after an AMI for any of the complications directly related to AMI, such as for hypotension, shock, fluid and electrolyte disturbances etc.

(2) Type 2 PACs - PACs suggesting Patient Safety Failures: Patients are also considered to have a PAC, if they have a readmission or receive other services during the 30-day post discharge period after an AMI for any of the complications related to patient safety failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores or for any of the CMS-defined hospital acquired conditions (HACs).

PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in any of the above settings, they get counted as a "yes" or a 1. The enclosed workbook labeled NQF_AMI_all_codes_risk_adjustment_06.30.15.xls serves as an example. The tab labeled PAC overview gives the percent of AMI episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in AMI episodes within this dataset.

The information is based on a two-year claims database from a large regional commercial insurer. The database had 3,258,706 covered lives and \$25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.

1d.3. Developer Rationale: Each individual PAC, when measured in isolation, provides a very limited picture of the performance of the provider(s) who are managing or co-managing the care of the patient. However, looking at all the PACs that may occur individually or concurrently in a patient with a given episode provides a comprehensive picture of the care received by the patient for that particular condition or illness.

#0704 Proportion of Patients Hospitalized with AMI that have a Potentially Avoidable Complication (during the Index Stay or in the 30-day Post-Discharge Period), Last Updated: Aug 21, 2015

Moreover, the frequency of occurrence of individual PACs may be so low that it may require very high sample sizes from individual providers to achieve any meaningful and reliable comparisons. But aggregating all the PACs into a single quality metric creates meaningful scores that can be compared across providers even with relatively smaller sample sizes.

Additionally, a comprehensive measure is easier to explain to the average consumer. From a patient's point of view, any bad outcome has an impact on their health with respect to return to work, functional limitations and need for additional support. If a provider has a high PAC rate with regards to one component PAC but not the other PACs, the impact on the patient is still adverse. In selecting providers, individual component PAC scores would mean nothing to a patient, but aggregating it to a comprehensive quality score could be a measure of "all-cause" harms and easier to interpret and act on.

S.4. Numerator Statement: Outcome: Number of patients hospitalized with AMI who had one or more potentially avoidable complications (PACs) during the index stay or in the 30-day post-discharge period.

S.7. Denominator Statement: Adult patients aged 18 years and above who had a relevant hospitalization for AMI and were followed for one-month after discharge.

S.10. Denominator Exclusions: Denominator exclusions include exclusions of either "patients" or "claims" based on the following criteria:

1. "Patients" excluded are those that do not meet the enrollment criteria. If patient has an enrollment gap for any time period during the episode time window, it is considered as an enrollment gap
 2. "Patients" are also excluded if the cost of the episode is an outlier at greater than 99th percentile or less than 1st percentile value for all episodes. This is another way to ensure that episodes are complete as well as they do not bring in random noise into the analysis due to inappropriate codes or services.
 3. "Claims" are excluded from the AMI measure if they are considered not relevant to AMI care or are for major surgical services, that suggests that AMI may be a comorbidity associated with the procedure e.g. CABG procedure.
- Patients where the index hospitalization claim is excluded are automatically excluded from both the numerator and the denominator.

De.1. Measure Type: Composite

S.23. Data Source: Claims

S.26. Level of Analysis: Facility, Integrated Delivery System

IF Endorsement Maintenance – Original Endorsement Date: Jan 17, 2011 **Most Recent Endorsement Date:** Jan 17, 2011

1d.1. Composite Measure Construction: any-or-none measures (e.g., any or none of a list of adverse outcomes experienced, or inappropriate or unnecessary care processes received, by each patient)

Component Measures (if endorsed or submitted for endorsement):

1. Evidence, Performance Gap, Priority – Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. **Measures must be judged to meet all subcriteria to pass this criterion and be evaluated against the remaining criteria.**

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form

[0704_AMI_Evidence_Attachment_HCI3-635717859546920334.docx](#)

1b. Performance Gap

Demonstration of quality problems and opportunity for improvement, i.e., data demonstrating:

- considerable variation, or overall less-than-optimal performance, in the quality of care across providers; and/or
- disparities in care across population groups.

1b.1. Briefly explain the rationale for this measure (e.g., the benefits or improvements in quality envisioned by use of this measure) Measures associated to potentially avoidable complication (PAC) have been used as comprehensive outcomes measures since 2007 for several conditions and procedures (de Brantes 2010) (Joynt 2013) (James 2013). In 2011, following the NQF endorsement of these measures for certain acute medical conditions (AMI, Pneumonia and Stroke), and for chronic conditions, they were adopted

for various purposes, including the creation of related measures (NQF – Measure #1550). Some commercial payers have used them as a means for tracking outcomes (Yong 2010) and for tiering providers for pay for performance programs (BCBSNC). In addition, some provider organizations have used them in quality improvement efforts by homing in on the detailed specifications of the measures to reveal opportunities for care improvement (CALPERS – link below). Identification of PACs has spurred provider innovation (Bundled Payment Summit 2015) for practice re-engineering, to create proactive care pathways, and to focus on areas of high variability (McVary 2010). Some employers are also using measures of avoidable complications as public measures of quality (Colorado Business Group on Health) given the research that demonstrated the potential efficacy of these measures to differentiate provider quality and cost (Hibbard 2012). In fact in a series of focus groups led by Judy Hibbard and colleagues, the researchers found that the very framing of potentially avoidable complications as an indicator of potential harm, is an effective way of communicating the quality of care. And when measures of PACs were presented in conjunction with price, consumers intuitively accepted the logical relationship between low PACs – fewer “defects” – and lower price.

Accountability for and measurement of PACs occurs at the practice, medical group, provider system or purchaser/payer level. PAC rates are calculated as absolute values. For example, a health plan would report that 60% of its plan members with AMI incurred PACs in the study time window. The objective of the measure is to encourage the unit being measured to progressively reduce that amount over time. In addition, comparisons of PAC rates across plans or provider systems should be encouraged and publicly reported. An organization that uses the measure should be able to identify the leading causes of PACs and implement improvements to existing processes that will decrease PACs. There are several tools available for provider systems and health plans to impact PAC rates. These include care coordination across care settings; post-discharge planning and patient follow-up, active care management, sharing medical record data between care settings and providers, total quality management within hospitals and active reduction of patient safety failures. Reducing PACs has the potential to significantly improve the overall level of quality.

Creating a single measure of accountability for physicians and hospitals tied to gaps in quality is likely to yield much improved outcomes for patients. A measure of accountability for health plans helps them review trends over time and work with physicians and hospitals to improve the ways in which they engage patients using more optimal care management and care coordination (Cassel 2014). In addition, PAC measures could be used as a surrogate for quality in a consumer transparency tool to differentiate providers with regards to their performance.

Moreover, since these measures are claims based, there is minimal added burden for collecting the data, and it also avoids potential gaming that may occur for other measures that require reporting information to registries. Although use of administrative claims data in identifying conditions and measuring provider quality has been questioned, there are several studies in literature that acknowledge validity of its use (Normand 2007) (Quan 2009). Until more readily available data are at hand, use of administrative data to measure provider performance has steadily increased (Miller 2001), (NQF Quality Positioning System). Interestingly, in the current fee for service system, services for most PACs are rewarded by continued payment (except the CMS defined “never events”) and hence to our advantage, adverse events surface in billing data. Claims based PAC measures; therefore serve as an alternative method to track adverse outcomes that do occur (Leibson 2008).

References:

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- 3) James JT. “A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care.” *J Patient Safety* 9.3 (2013): 122-128.
- 4) See, for example: NQF#1550: Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and / or total knee arthroplasty (TKA). Online version: <http://bit.ly/1BWQTRt>
- 5) Yong, Pierre L., Robert Samuel Saunders, and LeighAnne Olsen. *The Healthcare Imperative: Lowering Costs and Improving Outcomes: Workshop Series Summary*. Washington, D.C.: National Academies, 2010. Institute of Medicine of the National Academies, 17 Dec. 2010. Web.
- 6) Blue Cross Blue Shield of North Carolina: https://www.bcbsnc.com/assets/providers/public/pdfs/specialty_methodology.pdf

- 7) Community Campaigns for Quality Care. "Recommendations to Reduce Potentially Avoidable Complications (PACs) among CalPERS Employees." Editorial. Calpers.ca.gov. Community Campaigns for Quality Care, June 2012. Web.
- 8) 2015 Bundled Payment Summit – Day 1, Track IV: Washington DC June 3-5.
<http://www.bundledpaymentsummit.com/agenda/day1.html>
- 9) Micaela P. McVary. "The Prometheus Model: Bringing Healthcare into the Next Decade." *Annals of Health Law Advance Directive* 19 (2010): 274-284.
- 10) Colorado Business Group on Health: Healthcare Incentives Payment Pilot (HIPPI): <http://www.cbghhealth.org/projects/reducing-costs/healthcare-incentives-payment-pilot-hippi/>
- 11) Hibbard JH, Greene J, Sofaer S, Firminger K, Hirsh J. "An experiment shows that a well-designed report on costs and quality can help consumers choose high-value health care." *Health Aff (Millwood)* 31.3 (2012): 560-8. doi: 10.1377/hlthaff.2011.1168.
- 12) Cassel, Christine, MD et al. "Getting More Performance from Performance Measurement." *New England Journal of Medicine* 371 (2014): 2145-147. Web.
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- 14) Quan, H., N. Khan, B. R. Hemmelgarn, K. Tu, G. Chen, N. Campbell, M. D. Hill, W. A. Ghali, and F. A. Mcalister. "Validation of a Case Definition to Define Hypertension Using Administrative Data." *Hypertension* 54.6 (2009): 1423-428. Web.
- 15) Miller MR, Elixhauser A, Zhan C, and Meyer G. "Patient Safety Indicators: Using Administrative Data to Identify Potential Patient Safety Concerns." *Heath Services Research* 36.6.2 (2001): 110-132.
- 16) NQF: Quality Positioning System™. National Quality Forum, 2015. Web.: Available at <http://bit.ly/1ijl5Ar>, Last accessed June 29 2015.
- 17) Leibson CL1, et al. "Identifying in-hospital venous thromboembolism (VTE): a comparison of claims-based approaches with the Rochester Epidemiology Project VTE cohort." *Med Care* 46.2 (2008):127-32.

1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. *(This is required for endorsement maintenance. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included). This information also will be used to address the subcriterion on improvement (4b.1) under Usability and Use.*

The data included two years of administrative claims covering the period April 1, 2012 through December 17, 2014. There were a total 1,341 episodes of AMI.

Because facilities with small volumes may provide unreliable estimates, we excluded any with fewer than 10 attributed episodes prior to the calculations. After this exclusion 47 (out of 280) facilities remained. Performance scores of these providers (PAC rates) are summarized in the following table:

Unadjusted PAC Rates:

Median (IQR): 65.5% (59.4%, 75.6%)

Range: 30.0% - 93.3%

Risk-Standardized PAC Rates (RSPR):

Median (IQR): 66.6% (59.2%, 72.6%)

Range: 31.8% - 90.7%

Please refer to the NQF_AMI_all_codes_risk_adjustment_06.30.15.xls workbook under the "ProviderAttribution Reliability" tab to see specific results for each facility.

1b.3. If no or limited performance data on the measure as specified is reported in 1b2, then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.

Even though hospitalizations for AMI should be potentially avoidable in their own right; once they do occur, the index stay itself may have a potentially avoidable complication (PAC) or patients may develop a PAC during the 30-day post-discharge period. PACs lead to significant variability in outcomes including prolonged hospitalizations, readmissions and emergency room visits, all indicating poor outcomes that harm the patient, cause payers to incur unnecessary costs and could be improved by providers.

Umscheid et al (2008) used 2002 estimates of hospital-acquired infections (HAI) and determined the range of HAI risk reductions from US studies. They report that 18%-82% of blood-stream infections, 46%-55% of ventilator associated pneumonia, 17% - 69% of urinary tract infections and 26%-54% of surgical site infections are preventable (Ranji 2007). The National Pressure Ulcer Advisory Panel (NPUAP) reported in 2001 that pressure ulcer prevention programs had reported 50% or greater reductions in facility-acquired pressure ulcers (Cuddigan 2001). Similarly, appropriate prophylaxis could reduce the risk of venous thromboembolism by 45% in acutely ill medical patients (Leizorowicz 2004), and a recent study found a 50% reduction in thromboembolic events with extended pharmacologic prophylaxis (Hull 2007). Adequate evidence-based treatment protocols in preventing contrast nephropathy and adequate drug dosing have demonstrated a risk reduction between 52% and 90% in the incidence of acute renal failure in patients in the intensive care unit (Singri 2003). Additionally, use of hospital electronic medical systems has demonstrated that in a sample hospital that used prompts for protocols for nursing care, infection rates dropped 88%, bedsores were reduced and compliance to guidelines for care of patients on ventilator increased by 77% (Landro 2009).

Moreover, readmissions after heart attacks are taking their toll on cost and quality of care of AMI patients (Curry 2011) (Dharmarajan 2013) (Stranges 2012) (Jiang 2006). Readmissions constitute an important part of the PAC measure. It has been shown that in hospitals with high performance scores on risk-standardized mortality (low mortality rates) is not associated with an increase in readmission rates, alleviating fears that early discharge practices may lead to higher readmission rates (Krumholz 2011). CMS initiated the Hospital Readmissions Reduction Program (HRRP), in October 2012 in an effort to reduce the readmission rate of Medicare patients (Jack 2009). If the readmission rate exceeds the expected readmissions rates, then financial penalties are imposed. The Medicare Payment Advisory committee (MedPAC) report released in 2011 showed a small but significant risk-adjusted decrease in readmissions for PACs of AMI's by 1.1 % between 2009 and 2011 (MedPac 2013) (Joynt 2013). The main impact of the HRRP has been to increase the efforts of hospitals to reduce readmissions. Two-thirds of eligible hospitals had readmission rates that were higher than that predicted by the CMS model, highlighting the continued need for better care coordination across providers and the community to prevent PACs.

Importantly, recent studies have shown that high performing hospitals had fewer readmissions within 30 days for all common diagnoses, suggesting possible benefits of adopting strategies to reduce readmissions globally (Dharmarajan 2013). Another recent study demonstrated that despite an aging population in the US, current trends point towards a decrease in hospitalizations related to coronary artery disease events. Hospitalizations for AMI steadily decreased from 661,000 to 591,000 per year between 2002 and 2005, primarily due to decrease in transmural AMI. (Nallamotheu 2007). Decrease in rates of STEMI-AMI are a welcome trend and have been attributed to better processes in care and broader application of primary prevention measures for CAD with aspirin and statins. Similarly less smoking and better control of CAD risk factors such as hyperlipidemia and hypertension may be contributing to decreasing incidence in AMIs.

While PACs may not be completely eliminated, identifying their magnitude and understanding their causality, in particular for the most frequent or the most expensive, could lead to improving patient outcomes (de Brantes 2008) (de Brantes 2009).

References

- 1) Umscheid CA, Mitchell MD, Agarwal R, et al, Mortality from Reasonably-Preventable Hospital-Acquired Infections, (Philadelphia Penn Center for Evidence-based Practice Advisory, 2008). <http://www.shea-online.org/View/smid/428/ArticleID/178.aspx>.
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10) Stranges, Elizabeth, MS. "Statistical Brief #140." Readmissions for Heart Attack, 2009. Healthcare Costs and Utilization Project, Aug. 2012. Web.

11) Jiang HJ, Russo CA, and Barrett ML. Nationwide Frequency and Costs of Potentially Preventable Hospitalization, 2006. AHRQ-HCUP Statistical Brief # 72. Available at: <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb72.jsp>.

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13) Jack BW, Chetty VK, Anthony D et al. “A Reengineered Hospital Discharge Program to decrease Rehospitalization: A randomized trial.” *Ann Int Med* 150 (2009):178-187.

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1b.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity,

gender, age, insurance status, socioeconomic status, and/or disability. (This is required for endorsement maintenance. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.) This information also will be used to address the subcriterion on improvement (4b.1) under Usability and Use.

Not Applicable

1b.5. If no or limited data on disparities from the measure as specified is reported in 1b4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations.

Not Applicable

1c. High Priority (previously referred to as High Impact)

The measure addresses:

- a specific national health goal/priority identified by DHHS or the National Priorities Partnership convened by NQF; OR
- a demonstrated high-priority (high-impact) aspect of healthcare (e.g., affects large numbers of patients and/or has a substantial impact for a smaller population; leading cause of morbidity/mortality; high resource use (current and/or future); severity of illness; and severity of patient/societal consequences of poor quality).

1c.1. Demonstrated high priority aspect of healthcare

Affects large numbers, A leading cause of morbidity/mortality, Severity of illness, Patient/societal consequences of poor quality, High resource use

1c.2. If Other:

1c.3. Provide epidemiologic or resource use data that demonstrates the measure addresses a high priority aspect of healthcare.

List citations in 1c.4.

Acute Myocardial Infarction (AMI) is a common cause of hospitalization. In fact, in 2011, the aggregate costs of AMI hospital admissions were \$11.5 billion, representing the 5th most expensive reason for hospitalization in the US (Kauf 2006). This fact holds true across populations, as it was the 6th most expensive condition for the Medicare population, and the most expensive condition billed to the uninsured. Moreover, when AMI admissions incur potentially avoidable complications, these costs can go up several-fold and are truly a waste within the healthcare system (Torio 2011).

More broadly, potentially avoidable complications are rampant and programs are being set up in place to address them (Weaver 2013, Watcher 2013, Shekelle 2013). Moreover, readmissions after heart attacks are taking their toll on cost and quality of care of AMI patients (Curry 2011) (Dharmarajan 2013) (Stranges 2012) (Jiang 2006). The June 2007 MedPAC report to Congress on "Promoting Greater Efficiency in Medicare" highlighted the fact that in 2005, \$12 billion were spent on potentially preventable readmissions alone within 30 days of discharge from the hospital. Another study by Jencks and colleagues found that roughly 19.6% of Medicare patients incurred re-hospitalizations within 30 days of discharge (Jencks 2009). When hospitalizations do occur, they must be managed expeditiously and readmissions following discharge should be avoided (MedPac 2007).

De Brantes et al applied the Prometheus model of payment using data from a large commercial insurance database to show that, when a risk-adjusted "evidence informed case rate" (ECR) was applied to payments for the treatment of patients suffering from AMI, providers would have to reduce their rates of PAC's to roughly two-thirds of current rates in order to be consistently profitable (de Brantes 2009). Lewis et al suggest that a stratified approach targeting high impact conditions, using data to identify areas of opportunity and focused interventions with feedback loops could form a self-learning system that could avert "Triple Fail" events before they occur (Lewis 2013).

1c.4. Citations for data demonstrating high priority provided in 1a.3

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2. Torio, Celeste M., PhD, MPH, and Roxanne M. Andrews, PhD. "National Inpatient Hospital Costs: The Most Expensive Conditions by Payer 2011." Agency for Healthcare Research and Quality 160 (2013). Web.

3. Weaver, Sallie J., Lisa H. Lubomksi, Renee F. Wilson, Elizabeth R. Pfoh, Kathryn A. Martinez, and Sydney M. Dy. "Promoting a Culture of Safety as a Patient Safety Strategy." Annals of Internal Medicine 158.5_Part_2 (2013): 369-75. Web.

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 13. Lewis G, Kirkham H, and Vaithianathan V. "How Health Systems Could Avert "Triple Fail" Events that are Harmful, are Costly, and result in Poor Patient Satisfaction." *Health Affairs* 32.4 (2013): 669-676.
- 1c.5. If a PRO-PM (e.g. HRQoL/functional status, symptom/burden, experience with care, health-related behaviors), provide evidence that the target population values the measured PRO and finds it meaningful. (Describe how and from whom their input was obtained.)**
 Not Applicable

1d. Composite Quality Construct and Rationale

1d.1. A composite performance measure is a combination of two or more component measures, each of which individually reflects quality of care, into a single performance measure with a single score.

For purposes of NQF measure submission, evaluation, and endorsement, the following will be considered composites:

- Measures with two or more individual performance measure scores combined into one score for an accountable entity.
- Measures with two or more individual component measures assessed separately for each patient and then aggregated into one score for an accountable entity:
 - all-or-none measures (e.g., all essential care processes received, or outcomes experienced, by each patient); or
 - any-or-none measures (e.g., any or none of a list of adverse outcomes experienced, or inappropriate or unnecessary care processes received, by each patient).

1d.1. Please identify the composite measure construction: *any-or-none measures (e.g., any or none of a list of adverse outcomes experienced, or inappropriate or unnecessary care processes received, by each patient)*

1d.2. Describe the quality construct, including:

- the overall area of quality

- included component measures and
- the relationship of the component measures to the overall composite and to each other.

The PAC measures, as we define them, look at many “care defects” comprehensively. They are composed of several cross-cutting measures and together they paint a global picture of the provider’s overall performance.

We classify PACs into two types: Type 1 PACs are directly related to the index condition and are often controlled by the servicing provider; Type 2 PACs, on the other hand result from patient safety failures and could be reduced by better systems and better processes in care. Both types of PACs could occur in any setting and so could be identified through any type of claims coming in the administrative dataset, including in-patient, out-patient, or professional claims. PACs may occur any time during the episode time window. Furthermore, the measure is constructed so that the occurrence of any number of PACs during a defined episode would only count as one occurrence.

The PAC measure definitions encompass several other measures that are accepted as being valid complications of care and are widely used throughout the country. These include CMS defined Hospital Acquired Conditions (HACs), Hospital Inpatient Quality Reporting measures, Avoidable Readmissions, AHRQ defined patient safety indicators (PSIs), NQF endorsed patient safety measures such as patient fall rates, pressure ulcer rates, and peri-operative pulmonary embolism or deep vein thrombosis rates.

All defined PACs, irrespective of their type, or site of occurrence, are aggregated to create an overall comprehensive, composite measure. They all have equal weighting, since they are measured simply by the frequency of their occurrence.

1d.3. Describe the rationale for constructing a composite measure, including how the composite provides a distinctive or additive value over the component measures individually.

Each individual PAC, when measured in isolation, provides a very limited picture of the performance of the provider(s) who are managing or co-managing the care of the patient. However, looking at all the PACs that may occur individually or concurrently in a patient with a given episode provides a comprehensive picture of the care received by the patient for that particular condition or illness.

Moreover, the frequency of occurrence of individual PACs may be so low that it may require very high sample sizes from individual providers to achieve any meaningful and reliable comparisons. But aggregating all the PACs into a single quality metric creates meaningful scores that can be compared across providers even with relatively smaller sample sizes.

Additionally, a comprehensive measure is easier to explain to the average consumer. From a patient’s point of view, any bad outcome has an impact on their health with respect to return to work, functional limitations and need for additional support. If a provider has a high PAC rate with regards to one component PAC but not the other PACs, the impact on the patient is still adverse. In selecting providers, individual component PAC scores would mean nothing to a patient, but aggregating it to a comprehensive quality score could be a measure of “all-cause” harms and easier to interpret and act on.

1d.4. Describe how the aggregation and weighting of the component measures are consistent with the stated quality construct and rationale.

In constructing the comprehensive composite PAC measure, each component PAC, as clinically defined by the subject matter experts, was given the same weight so that arbitrary weights may not bias the results. Furthermore, the measure is constructed so that the occurrence of any number of PACs during a defined episode would only count as one occurrence. As such, the patient is the ultimate unit of measurement and if the patient incurred any PAC during the episode, then that counts against the numerator.

Since the emphasis of the PAC measure was to simply identify the occurrence of PACs in any setting, aggregation of the PAC counts to create a comprehensive quality score with equal weights has been met with overall support from the clinical working groups as well as from the implementation sites.

2. Reliability and Validity—Scientific Acceptability of Measure Properties

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. ***Measures must be judged to meet the subcriteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.***

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2a.1. Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the Quality Data Model (QDM).

De.5. Subject/Topic Area (check all the areas that apply):

Cardiovascular, Cardiovascular : Coronary Artery Disease (AMI)

De.6. Non-Condition Specific (check all the areas that apply):

Care Coordination, Care Coordination : Readmissions, Care Coordination : Transitions of Care, Safety, Safety : Complications, Safety : Healthcare Associated Infections, Safety : Medication

S.1. Measure-specific Web Page (Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.)

http://www.hci3.org/ecr_descriptions/ecr_description.php?version=5.2.006&name=AMI&submit=Submit

S.2a. If this is an eMeasure, HQMF specifications must be attached. Attach the zipped output from the eMeasure authoring tool (MAT) - if the MAT was not used, contact staff. (Use the specification fields in this online form for the plain-language description of the specifications)

This is not an eMeasure Attachment:

S.2b. Data Dictionary, Code Table, or Value Sets (and risk model codes and coefficients when applicable) must be attached. (Excel or csv file in the suggested format preferred - if not, contact staff)

Attachment Attachment: [NQF_AMI_all_codes_risk_adjustment_06.30.15_updated-635757125324132150.xlsx](#)

S.3. For endorsement maintenance, please briefly describe any changes to the measure specifications since last endorsement date and explain the reasons.

Measure specifications have been updated since the last endorsement in the following ways:

1. The code tables have been revised to make them more user-friendly and readable. Earlier we had referenced the AHRQ-CCS categories that mapped to the PAC (potentially avoidable complications) definitions. Now we have displayed the codes as either I-9 or I-10 codes so it is easier for users to use and implement the measure in their own programs.
2. All codes have been updated to 2015 (current codes) and ICD-10 code conversions are included.
3. We no longer define PACs with procedure codes. PAC definitions are based on diagnosis codes and these drive the services for care of the complication. For example, if there is an in-patient infectious disease consultation service for sepsis, the diagnosis code of sepsis on the claim is the tag that alerts the user that there is a complication.
4. The PAC types have been redefined from three PAC types to only two PAC types. The previous type 2 PACs related to comorbidities have been dropped. We now have Type 1 PACs that are directly related to the index condition, and PACs related to patient safety failures have been renumbered to be called Type 2 PACs.
5. The service assignment logic has been modified to accommodate concurrent episodes. All services that are relevant to an episode are multi-assigned to all relevant open episodes. So if a patient had both AMI and diabetes, the services relevant to both will be assigned to both episodes, thereby preventing the possibility of under-counting potentially avoidable complications.
6. We have expanded our databases to include the Medicaid population.

Our team, within HCI3, has been working with various pilot sites across the country to use our PAC (potentially avoidable complications) measures for reporting outcomes at the population level.

S.4. Numerator Statement (Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome)

IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm.

Outcome: Number of patients hospitalized with AMI who had one or more potentially avoidable complications (PACs) during the index stay or in the 30-day post-discharge period.

S.5. Time Period for Data (What is the time period in which data will be aggregated for the measure, e.g., 12 mo, 3 years, look back

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to August for flu vaccination? Note if there are different time periods for the numerator and denominator.)
The time window starts with a hospitalization for AMI and continues for one month after discharge.

S.6. Numerator Details (All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)
IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm.

Patients that have an index hospitalization for AMI, and are identified as having services for potentially avoidable complications (PACs), either during the index hospitalization or within one month after discharge from the index hospitalization. The enclosed excel workbook entitled NQF_AMI_all_codes_risk_adjustment_06.30.15 gives the detailed codes for PACs in the tabs entitled PACs I-9 and PACs I-10. PACs are identified only based on diagnosis codes.

Services for PACs are identified as follows:

- a. Any Index stay for AMI that has a PAC diagnosis code in any position except in the PRIMARY (principal) position is considered as having a potentially avoidable complication
- b. Any readmission to an acute care facility 2 days or later after discharge but within 30-days post-discharge, that is relevant to AMI
- c. Any admission to a post-acute care facility that is relevant to AMI and has a PAC code in any position on the claim
- d. Any other service (professional, outpatient facility, ancillary) that is relevant to AMI and has a PAC code in any position on the claim

S.7. Denominator Statement (Brief, narrative description of the target population being measured)

Adult patients aged 18 years and above who had a relevant hospitalization for AMI and were followed for one-month after discharge.

S.8. Target Population Category (Check all the populations for which the measure is specified and tested if any):

Elderly, Populations at Risk, Populations at Risk : Dual eligible beneficiaries, Populations at Risk : Individuals with multiple chronic conditions, Populations at Risk : Veterans

S.9. Denominator Details (All information required to identify and calculate the target population/denominator such as definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)

Please refer to the enclosed excel workbook entitled
NQF_AMI_all_codes_risk_adjustment 06.30.15

The target population should have the following criteria:

1. Have an index hospitalization with a trigger code in the principal position of an inpatient stay claim as defined in the AMI TRIGGERS tab (Triggers I-9 or Triggers I-10).
2. The patient should have continuous enrollment for the entire time window with no enrollment gaps with the entity providing the data (so we can ensure that the database has captured all the claims for the patient in the time window).
3. The patient should have a complete episode time window in the claims data – so the end date of the episode should not be past the database claims end date.
4. Patient should be at least 18 years of age
5. Patients that have a trigger code on a professional claim and have no associated facility bill are considered as having an orphan (incomplete) episode and are dropped from analysis (for procedural episodes only).

Once the episode is triggered all relevant claims are assigned to the episode. Relevant claims could be inpatient facility claims, outpatient facility claims, professional services, laboratory services, imaging services, ancillary claims, home health, durable medical equipment as well as pharmacy claims across the entire continuum of care centered around the patient's episode of care. Relevant claims are identified as those that have a diagnosis code that matches the codes in the typical Dx codes tabs (Typical Dx I-9 or Typical Dx I-10), or in the PAC Dx codes tab (PACs I-9 or PACs I-10) AND a procedure code as identified in the Relevant Procedures I-9 & I-10 tab in the enclosed workbook.

S.10. Denominator Exclusions *(Brief narrative description of exclusions from the target population)*

Denominator exclusions include exclusions of either "patients" or "claims" based on the following criteria:

1. "Patients" excluded are those that do not meet the enrollment criteria. If patient has an enrollment gap for any time period during the episode time window, it is considered as an enrollment gap
 2. "Patients" are also excluded if the cost of the episode is an outlier at greater than 99th percentile or less than 1st percentile value for all episodes. This is another way to ensure that episodes are complete as well as they do not bring in random noise into the analysis due to inappropriate codes or services.
 3. "Claims" are excluded from the AMI measure if they are considered not relevant to AMI care or are for major surgical services, that suggests that AMI may be a comorbidity associated with the procedure e.g. CABG procedure.
- Patients where the index hospitalization claim is excluded are automatically excluded from both the numerator and the denominator.

S.11. Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)*

Denominator exclusions include exclusions of "patients" as well as "claims" not relevant to AMI care. Patients where the index hospitalization claim is excluded are automatically excluded from both the numerator and the denominator.

Please refer to the enclosed excel workbook entitled (NQF_AMI_all_codes_risk_adjustment 06.30.15.xls)

1. "Patients" are excluded from the measure if they meet one of the following criteria:

- a. If age is < 18 years
- b. If gender is missing
- c. If they do not have continuous enrollment for the entire time window with the entity providing the data (this helps determine if the database has captured all the claims for the patient in the time window).
- d. If the episode time window extends beyond the dataset end date (this helps eliminate incomplete episodes).
- e. The episode cost is an outlier (less than 1st percentile or greater than 99th percentile value for all episodes of the same type). This eliminates extreme variation that may result from random outlier events.
- f. If the index hospitalization is a trigger for a major surgical procedure such as coronary bypass procedure or angioplasty, suggesting that AMI may be a comorbidity or an indication for the surgery.

2. "Claims" are excluded from the measure if they meet one of the following criteria:

- a. If none of the diagnosis codes on the claim are on the list of "triggers" or relevant diagnosis codes (either typical Dx or PAC Dx) for AMI
- b. If none of the procedure / CPT codes on the claim are on the list of relevant procedure codes for AMI.
- c. The "principal" diagnosis on an inpatient stay claim during the episode time window triggers its own episode
- d. The procedure code on a claim during the episode time window triggers its own episode

S.12. Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b)*

None

S.13. Risk Adjustment Type (Select type. Provide specifications for risk stratification in S.12 and for statistical model in S.14-15)

Statistical risk model

If other:

S.14. Identify the statistical risk model method and variables *(Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development and testing should be addressed with measure testing under Scientific Acceptability)*

Conceptual Model

Variations in outcomes across populations may be due to patient-related factors or due to provider-controlled factors. When we adjust for patient-related factors, the remaining variance in PACs are due to factors that could be controlled by all providers that are

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managing or co-managing the patient, both during and after hospitalization.

Statistical Method:

Logistic Regression model to determine the probability of a patient incurring a PAC

Demographic variables, comorbid conditions, as well as clinical severity indicators are fed as independent risk factors into the model. Risk Factors are collected historically. Subtype information is collected from the index claim and any look-back period, if relevant. Subtypes are clinical severity indicators suggesting severity of the episode itself, for example, the extent of the infarction in an AMI patient. For each patient the “predicted” coefficients from the risk adjustment models are summed to give the predicted probabilities of the occurrence of a PAC.

Risk Factors : (Please refer to the enclosed excel workbook entitled (NQF_AMI_all_codes_risk_adjustment 06.30.15.xls). The risk factors along with their codes are listed in the tabs called “All Risk Factors I-9” and “All Risk Factors I-10” and also listed below:

AGE CONTINUOUS VARIABLE

GENDER FEMALE = 1 (MALE IS REFERENCE = 0)

| Risk Factor # | Risk Factor Name |
|---------------|--|
| RF0101 | Anoxic Brain Damage, persistent vegetative state |
| RF0102 | Delirium, Meningitis, Encephalitis |
| RF0103 | Previous Stroke, Paralysis |
| RF0104 | Cerebral Palsy and Other Paralytic Syndromes |
| RF0105 | Spinal Cord Disorders/Injuries |
| RF0106 | Polyneuropathy |
| RF0107 | Multiple Sclerosis |
| RF0108 | Convulsions, Epilepsy |
| RF0109 | Dementia |
| RF0110 | Parkinson’s and Huntington’s Diseases |
| RF0111 | Cerebrovascular Disease |
| RF0115 | after care, rehabilitation |
| RF0201 | visual loss, blindness, retinal tear, detachment |
| RF0301 | ENT, Upper Respiratory Problems |
| RF0401 | Respiratory Failure, O2, ventilator dependence |
| RF0402 | Advanced COPD, Asthma |
| RF0403 | Empyema, bronchiectasis, Pneumonias |
| RF0404 | Aspiration Pneumonia, Laryngeal Problems |
| RF0406 | TB, Pneumoconiosis, Aspergillosis |
| RF0407 | Tobacco use, Lung disease due to External Fumes |
| RF0408 | Other Lung Disease |
| RF0501 | Previous Shock, Syncope, Vent Fibrillation |
| RF0503 | Advanced CHF |
| RF0504 | Cardiomyopathy, valve disorders |
| RF0505 | Cardiac Arrhythmias, Heart Block |
| RF0506 | Pacemaker, AICD |
| RF0507 | Endocarditis, Other post surgical cardiac problems |
| RF0508 | Other Cardiovascular Disease |
| RF0511 | DVT, Pulm Embolism, Pulm Heart Disease |
| RF0512 | Unstable Angina |
| RF0513 | Hypotension, chronic, orthostatic |
| RF0514 | Hyperlipidemia |
| RF0515 | Intraaortic Balloon Pump |
| RF0516 | ventricular assist device, ecmo, prolonged bypass |
| RF0517 | Previous electrophysiology studies, cryoablation |
| RF0518 | Recent AMI |
| RF0519 | Previous PCI |

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RF0520 Previous CABG
 RF0521 Previous Heart & Valve Surgery
 RF0522 Previous aortic reconstruction
 RF0523 Previous carotid endarterectomy
 RF0524 Aortic and peripheral vascular disease
 RF0525 Advanced Aortic and Vascular Disease
 RF0601 GI Bleed
 RF0602 Intestinal Obstruction/Perforation
 RF0603 Acute Gastritis, Duodenitis
 RF0604 Gastroduodenal Ulcer
 RF0606 Intestinal Uro-genital Fistula
 RF0607 Abdominal hernia w complications
 RF0608 Vascular insufficiency of intestine
 RF0609 Inflammatory Bowel Disease
 RF0610 Irritable Bowel
 RF0611 Diverticulitis, Meckel's
 RF0612 Digestive congenital anomalies
 RF0613 Intestinal infection
 RF0614 Esophageal Perforation, Hmg, Barretts, Compl Hiatal Hernia
 RF0615 Abnormal weight loss
 RF0616 Achalasia, Esophageal spasm, Stricture, Dysphagia
 RF0617 GERD, Hiatal Hernia, Other Upper GI Disorders
 RF0618 Previous Bariatric Surgery
 RF0619 Hx of colon polyps, family Hx of colon cancer
 RF0620 Enterostomy, GI devices, lap band
 RF0701 Pancreatic Disease
 RF0702 Perforation, fistula GB, bile duct, pancreas
 RF0703 Gall stones, cholecystitis
 RF0704 End-Stage Liver Disease
 RF0705 Hepatitis, Cirrhosis, Other Hepatobiliary Disorders
 RF0706 Recent Gall Bladder, Hepatobiliary Surgery
 RF0707 Acute Pancreatitis, pseudo cyst
 RF0801 Bone/Joint/Muscle Infections/Necrosis
 RF0802 Muscular Dystrophy
 RF0803 Osteoporosis, osteitis deformans, pathological fracture
 RF0804 Rheumatoid Arthritis and Inflammatory Connective Tissue Disease
 RF0805 Gout and other crystal arthropathies
 RF0806 Other arthropathies
 RF0807 Osteoarthritis
 RF0808 Joint Deformities
 RF0809 Knee derangements
 RF0810 Traumatic Dislocation Knee
 RF0811 Dislocation Hip
 RF0812 Synovitis, Ruture Tendon
 RF0813 Status Knee Replacement
 RF0814 Status Total Hip Replacement
 RF0901 Decubitus Ulcer
 RF0902 Skin and wound problems
 RF1001 Diabetes, poor control
 RF1002 Advanced diabetes
 RF1003 diabetes
 RF1101 Acute renal failure
 RF1102 Dialysis Dependent
 RF1103 Nephritis

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RF1104 Chronic renal failure
 RF1105 Urinary Tract Infections
 RF1301 Endometriosis
 RF1302 Fibroid uterus, benign tumors of female organs
 RF1303 Pelvic Inflammatory disease
 RF1304 Uterine prolapse, cystocele, vaginocoele
 RF1305 Female Hormonal Disorders
 RF1306 Ovarian, Broad Ligament Disorders
 RF1308 Other disorders of uterus, cervix
 RF1309 Menopausal Disorders
 RF1310 Menstrual Disorders
 RF1401 Multiparity, multigravida
 RF1402 Elderly Primi, other
 RF1403 Poor obstetric history
 RF1406 Cervical incompetence
 RF1407 Abnormalities of uterus, female genital tract
 RF1408 Hypertension, pre-eclampsia in Pregnancy
 RF1409 Severe pre-eclampsia w HTN, Eclampsia
 RF1410 Maternal, gestational diabetes, large for date
 RF1411 Genital Herpes
 RF1412 Infections of genitourinary tract, venereal disease in pregnancy
 RF1413 Infectious Diseases in Mother
 RF1414 Cardiovascular disease in Mother
 RF1415 Mental Disorders in Mother
 RF1416 Epilepsy in Mother
 RF1417 Liver and biliary tract disorders in mother
 RF1418 Kidney Disease in Mother
 RF1419 Other Maternal conditions
 RF1421 Cephalopelvic Disproportion due to maternal causes
 RF1436 Peripartum Cardiomyopathy
 RF1441 Previous Cesarean section
 RF1450 Maternal Obesity, previous Bariatric Surgery
 RF1454 Previous Rupture Uterus, Obstetrical Trauma
 RF1458 Complicated Pregnancy Delivery
 RF1460 Thrombophlebitis, DVT during Pregnancy
 RF1461 Puerperal Sepsis, other major puerperal complications
 RF1462 Obstetrical Embolism, Air, Amniotic Fluid, Pulm, Pyemic
 RF1467 Tobacco Use in Mother
 RF1601 Bleeding Disorders
 RF1602 Severe Hematological Disorders
 RF1603 Disorders of Immunity
 RF1604 Nutritional and other Anemias
 RF1605 Long-term use of anticoag, Aspirin
 RF1701 Head and Neck Cancers
 RF1702 Lung and Intrathoracic Cancers
 RF1703 Neuroendocrine, Myeloproliferative Cancers
 RF1704 Poorly differentiated, Secondary, Metastatic Cancers
 RF1705 Other Tumors
 RF1706 Acute Leukemia
 RF1707 Cancer uterus, localized female organs
 RF1708 Colorectal, Hepatobiliary and other GI cancers
 RF1709 Breast, Prostate, Thyroid cancers
 RF1710 Testicular Cancer and localized of male organs
 RF1711 Cancer of Bladder and Urinary Tract

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RF1712 Musculoskeletal Cancers
 RF1801 Sepsis, MRSA, Opportunistic infections
 RF1901 Schizophrenia
 RF1902 Major Depressive, Bipolar, and Paranoid Disorders
 RF2001 Drug/Alcohol Psychosis
 RF2002 Drug/Alcohol Dependence
 RF2101 Drug Reactions, long term use of drugs
 RF2102 Intra-abdominal injury
 RF2201 Extensive Third-Degree Burns
 RF2301 Major Organ Transplant Status
 RF2302 Artificial Openings for Feeding or Elimination
 RF2303 Complications of Medical & Surgical Care and Trauma
 RF2304 severe morbid obesity
 RF2305 morbid obesity
 RF2306 obesity
 RF2307 mild sleep apnea, hypoventilation
 RF2308 moderate sleep apnea, hypoventilation
 RF2309 obstructive sleep apnea
 RF2310 Severe Protein-Calorie Malnutrition
 RF2311 Mild-mod malnutrition
 RF2401 Severe Head Injury
 RF2402 Major Head Injury
 RF2403 Vertebral Fractures without Spinal Cord Injury
 RF2404 Falls, Fractures
 RF2405 Amputation
 RF2501 HIV/AIDS

Subtypes for AMI

AMI Subtypes

STEMI

Subendocardial infarct

Previous CABG, PCI

Morbid Obesity

Obesity

As you may notice some of the covariates (risk factors) such as obesity are collected from both historical claims as well as from the index stay and look-back period of the episode.

The prevalence of the risk factors in our reference dataset are listed in the enclosed workbook entitled NQF_AMI_all_codes_risk_adjustment 06.30.15.xls – see tab “Risk Factor Prevalence”. The output of the regression model are given in the same workbook in the tab “Risk Model”.

S.15. Detailed risk model specifications (must be in attached data dictionary/code list Excel or csv file. Also indicate if available at measure-specific URL identified in S.1.)

Note: Risk model details (including coefficients, equations, codes with descriptors, definitions), should be provided on a separate worksheet in the suggested format in the Excel or csv file with data dictionary/code lists at S.2b.

Available in attached Excel or csv file at S.2b

S.15a. Detailed risk model specifications (if not provided in excel or csv file at S.2b)

S.16. Type of score:

Rate/proportion

If other:

S.17. Interpretation of Score (Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)

Better quality = Lower score

S.18. Calculation Algorithm/Measure Logic (Describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; aggregating data; risk adjustment; etc.)

Please refer to the enclosed excel workbook entitled (NQF_AMI_all_codes_risk_adjustment 06.30.15.xls).

Assembling the Denominator:

Using administrative claims database, patients with AMI are identified as those having a hospitalization for AMI if the principal diagnosis on the stay claim matches the trigger codes for AMI as identified in the tab called "Triggers I-9" or "Triggers I-10".

Patients are retained if they are 18 years of age or more, do not have a missing gender, have continuous enrollment for the entire episode time window, their entire time window is covered in the claims dataset, and have no outlier episode costs. The index hospitalization, as well as all relevant professional, laboratory, imaging, ancillary and other claims that are incurred during the hospitalization and for one month following discharge after an AMI related hospitalization are included as part of the episode. Claims are considered relevant to AMI care if they have one of the diagnosis codes, as listed on the tab entitled Triggers I-9, Triggers I-10, PACs I-9, PACs I-10, Typical Dx I-9, or Typical Dx I-10 in any position on the claim AND a procedure code as identified in the Relevant Procedures I-9 & I-10 tab in the enclosed workbook. Readmissions carrying diagnosis codes relevant to AMI, and relevant admissions to post-acute care facilities are also included in the denominator. All relevant pharmacy claims carrying codes that match the ingredients listed in the Pharmacy tab of the enclosed workbook are also included as part of the episode.

If a patient has more than one concurrent episode, and the claim is relevant to both episodes, the claim could get multi-assigned, except in the case of procedural episodes that get carved out with respect to the index stay. So if an inpatient stay claim carried a principal Dx code that matched the trigger diagnosis code for AMI but they also had a procedure code for CABG (coronary artery bypass surgery), the stay claim would get uniquely assigned to CABG and not be counted with AMI.

Once all the episodes are assembled, episodes that match the exclusion criteria, such as those with outlier costs, are flagged (those with total episode costs less than 1st percentile or greater than 99th percentile), and excluded from the final analysis.

Assembling the Numerator:

For every episode included in the denominator, services are flagged as having a PAC (potentially avoidable complication) based on the criteria listed below:

- Any Index stay that has a PAC diagnosis code in any position except in the PRIMARY (principal) position is considered as having a potentially avoidable complication

- Any readmission to an acute care facility 2 days or later after discharge but within 30-days post-discharge

- Any admission to a post-acute care facility with a PAC code in any position on the claim

- Any other service (professional, outpatient facility, ancillary) with a PAC code in any position on the claim

Relevant claims that do not have any PAC codes, and do not qualify as a PAC based on the criteria outlined above, are listed as typical claims. All included relevant pharmacy services are flagged as typical. Patients that have even a single PAC claim are counted as part of the numerator.

Calculating the measure:

Proportion of AMI patients that have PACs is simply the ratio of patients with PACs within the AMI population and is called the PAC rate as shown in the equation below:

$$\text{PAC rate} = \text{Patients with AMI that have at least one PAC claim} / \text{Total number of AMI patients}$$

A flow chart demonstrating the series of steps and the counts of patients at each step is shown in tab entitled Decision Tree of the

enclosed workbook called [NQF_AMI_all_codes_risk_adjustment 06.30.15.xls](#)

Drill Down Calculations:

Further analysis from this construct helps create actionable reports.

For example as shown in the tab labeled PAC overview, not only do we have the PAC rate for a population, we can calculate the frequency of PACs occurring during the index stay, and break them down by the PAC type – type 1 being directly related to AMI and so actionable by the servicing physician, while type 2 PACs are related to patient safety failures and can be improved by process improvement by hospitals. Additionally, analyzing what portion of the PACs occur during the index stay, vs. in the post-discharge period and how many are due to readmissions helps focus strategies in reducing them.

Risk Adjustment:

Once we have the observed PAC rates, we risk-adjust them for patient factors such as patient demographics, comorbidities collected historically, and for severity of illness or procedure using subtypes collected from the index stay and / or look-back period. This helps adjust for factors outside the providers control and levels the playing field for provider performance comparisons.

Unit of Analysis:

The unit of analysis is the individual episode.

Dependent Variable:

The dependent variable is a dichotomous variable indicating whether an episode had one or more claims assigned as a PAC (=1) or not (=0).

Independent Variables:

A number of patient-related “risk factors” or covariates are included in the models:

Patient demographics: age, gender, and an indicator of whether a member has enrolled within the previous 6 months. This latter risk factor is intended to account for the patient’s lack of claims history, which limits the number of potential comorbidities that can be identified.

Comorbidities: These are conditions or events that occurred prior to the start of the episode that can have a potential impact on the patient’s risk of having a PAC. The risk factors are 170 disease indicators (0/1) identified through the presence of ICD diagnosis codes on individual medical claims and collected from the historical claims data before the start of an episode. These are universally applied across all episodes. Please see the tab labeled “All Risk Factors I-9” and “All Risk Factors I-10” for a list of risk factors and their corresponding codes in the enclosed workbook called [NQF_AMI_all_codes_risk_adjustment 06.30.15.xls](#)

Episode Subtypes or Severity Markers: These are markers that distinguish an episode as being more severe than another. They indicate either specific patient comorbidities that are known to make the procedure or condition more difficult to treat (e.g., obesity) or severity of the illness itself (e.g., STEMI vs. subendocardial infarct). Please see the tab labeled “Subtypes I-9” and “Subtypes I-10” for a list of subtypes and their corresponding codes in the enclosed workbook called [NQF_AMI_all_codes_risk_adjustment 06.30.15.xls](#)

As mentioned previously, to avoid creating perverse incentives all comorbidities and subtypes are identified prior to or at the very start of the episode. None are identified during the episode period.

Statistical Methods

We use logistic regression to model the probability of at least one PAC occurring during the episode. Only comorbidities and subtypes are included in the models as covariates if they are present in at least 10 episodes to prevent unstable coefficients. No further model building is conducted after the initial models are built. This reflects a desire to explain as much variation in the probability of having a PAC as possible, but it does not make it a priority that all covariates in the model be individually significant or even uncorrelated with each other. Accordingly, the model uses a very large group of covariates. This modeling approach allows for fewer potentially artificial constraints around the definitions of what constitutes severity of a episode condition, and lets each regression model determine for itself which of the factors are more significant for a specific episode. Non-significant covariates in episode models can not overly influence predicted outcomes, nor is much harm realized, if a group of correlated covariates work together to explain variation rather than having the variation explained by a single best factor.

When more than one line of business is included in the data, separate models are calculated for each sample (i.e., commercial, Medicaid etc.).

Provider Attribution and calculating PAC rates by provider:

Once episodes are constructed they are attributed to providers based on one of the various attribution rules. For AMI, episodes are attributed to the facility where the index hospitalization occurred.

Using the logistic regression technique described above, a model is developed that gives estimates for each risk factor and subtype for the patients in the population analyzed. These estimates are used to develop patient-level probabilities for the occurrence of PACs. The patient-level probability estimates are summed to construct aggregated measures (e.g., facility/provider-level). This method is similar to the methods employed by the Centers for Medicare and Medicaid Services (CMS) and endorsed by the National Quality Forum (NQF) to construct similar facility- and practice-level measures (i.e., mortality, readmissions, etc.):

1. For each provider, the number of actual observed occurrences of the outcome is summed across all attributed patients with that episode, to give the observed PAC rates for the provider.
2. Similarly adjusted probabilities from the risk adjustment models are summed across all attributed patients to give expected PACs for the provider.
3. The observed sum is then divided by the summed probabilities (O/E). This number yields whether the provider or facility had more PACs than expected (ratio>1), as expected (ratio=1), or less than expected (ratio<1). This calculation yields a practice-level unstandardized performance ratio.
4. To facilitate accurate comparisons of rates across units of analysis, this ratio is then standardized to the community rate using the indirect method. Specifically, the provider-level rate is multiplied by the expected community rate, calculated as the sum of adjusted probabilities for every individual in the sample across all providers in the analysis. This measure, known as the standardized rate, represents what the unit's risk-adjusted rate would be for the outcome of interest if its patient population was reflective of the of the overall community.

The formula for this calculation is as follows:

$$\text{Adj Outcome}_j = \left\{ \frac{\text{SUM Observed}_{ij}}{\text{SUM Prob}_{ij}} \right\} \times \left\{ \frac{\text{SUM Prob}_i}{\text{\# of episodes}} \right\}$$

Where individual is attributed to unit of analysis j (e.g., practice, provider, etc.)

Minimum sample size requirements for PAC measures are a function of the reliability testing of the measures on every dataset on which the measures are applied. Our research suggests that minimum sample sizes to achieve high degrees of reliability in the measures are a function of the dataset analyzed, and as such may vary from dataset to dataset. One should not infer that a minimum sample size achieved in one dataset will apply to another.

S.19. Calculation Algorithm/Measure Logic Diagram URL or Attachment *(You also may provide a diagram of the Calculation Algorithm/Measure Logic described above at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)*
Available in attached appendix at A.1

S.20. Sampling *(If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)*

IF a PRO-PM, identify whether (and how) proxy responses are allowed.

Not applicable

S.21. Survey/Patient-reported data *(If measure is based on a survey, provide instructions for conducting the survey and guidance on minimum response rate.)*

IF a PRO-PM, specify calculation of response rates to be reported with performance measure results.

Not applicable

S.22. Missing data (specify how missing data are handled, e.g., imputation, delete case.)

Required for Composites and PRO-PMs.

If patient related data is missing, the case is deleted from both the numerator and denominator

| |
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| <p>S.23. Data Source (Check <i>ONLY</i> the sources for which the measure is SPECIFIED AND TESTED). If other, please describe in S.24. Claims</p> <p>S.24. Data Source or Collection Instrument (Identify the specific data source/data collection instrument e.g. name of database, clinical registry, collection instrument, etc.) If a PRO-PM, identify the specific PROM(s); and standard methods, modes, and languages of administration. The information is based on a two-year claims database from a large regional commercial insurer. The database has 3,258,706 covered lives and \$25.9 billion in “allowed amounts” for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.</p> <p>The methodology can be used on any claims database with at least two years of data and a minimum of 150 patients with the index condition or hospitalization. Having pharmacy data adds to the richness of the risk-adjustment models.</p> <p>The calculations of rates of potentially avoidable complications can be replicated by anyone that uses the measure specifications along with the metadata file that is available for free on our web site at http://www.hci3.org/ecre/xml-agreement.html. We also plan on providing a limited automated analysis, at no cost, on our website. The methodology has been tested on databases of several health plans as well as on a few employer databases.</p> <p>No data collection instrument was used.</p> <p>S.25. Data Source or Collection Instrument (available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1) No data collection instrument provided</p> <p>S.26. Level of Analysis (Check <i>ONLY</i> the levels of analysis for which the measure is SPECIFIED AND TESTED) Facility, Integrated Delivery System</p> <p>S.27. Care Setting (Check <i>ONLY</i> the settings for which the measure is SPECIFIED AND TESTED) Inpatient/Hospital, Other If other: Across the care continuum</p> <p>S.28. COMPOSITE Performance Measure - Additional Specifications (Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.)</p> <p>2a. Reliability – See attached Measure Testing Submission Form 2b. Validity – See attached Measure Testing Submission Form 0704_AMI_CompositeMeasTesting_Reliability_Validity_HCI3-635757135531745583.docx</p> |
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| <p>3. Feasibility</p> <p>Extent to which the specifications including measure logic, require data that are readily available or could be captured without undue burden and can be implemented for performance measurement.</p> <p>3a. Byproduct of Care Processes For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).</p> <p>3a.1. Data Elements Generated as Byproduct of Care Processes. Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims) If other:</p> <p>3b. Electronic Sources</p> |
|--|

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The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

3b.1. To what extent are the specified data elements available electronically in defined fields? (*i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields*)

ALL data elements are in defined fields in electronic claims

3b.2. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources.

3b.3. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL.

Attachment:

3c. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

3c.1. Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.

IF a PRO-PM, consider implications for both individuals providing PROM data (patients, service recipients, respondents) and those whose performance is being measured.

As part of our general implementation of these measures and related analyses, we have worked through dozens of different and sometimes very large datasets. From Medicare to Medicaid to regional and national commercial carriers, as well as individual employers, the principal lesson learned is the heterogeneity of the data sets and the significant variability in fill rate of critical data elements. As a result, we have created highly specific recommendations for which data elements are required to ensure measure validity, the accuracy of those data elements, and their completeness in the dataset. When claims datasets are organized in the way we specify in the measure analysis, and contain the coding information required, the analysis of the measure and its results are highly reliable.

3c.2. Describe any fees, licensing, or other requirements to use any aspect of the measure as specified (*e.g., value/code set, risk model, programming code, algorithm*).

The calculations of rates of potentially avoidable complications can be replicated by anyone that uses the measure specifications along with the metadata file that is available for free on our web site at <http://www.hci3.org/ecre/xml-agreement.html>.

We also plan on providing a limited automated analysis, at no cost, on our website.

4. Usability and Use

Extent to which potential audiences (e.g., consumers, purchasers, providers, policy makers) are using or could use performance results for both accountability and performance improvement to achieve the goal of high-quality, efficient healthcare for individuals or populations.

4a. Accountability and Transparency

Performance results are used in at least one accountability application within three years after initial endorsement and are publicly reported within six years after initial endorsement (or the data on performance results are available). If not in use at the time of initial endorsement, then a credible plan for implementation within the specified timeframes is provided.

4.1. Current and Planned Use

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

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| Planned | Current Use (for current use provide URL) |
|---|---|
| Public Reporting | Payment Program Blue Cross Blue Shield of North Carolina https://www.bcbsnc.com/ Horizon Blue Cross Blue Shield of New Jersey http://www.horizonblue.com/ Pennsylvania Employee Benefits Trust Fund https://www.pebtf.org/ |
| Professional Certification or Recognition Program | Quality Improvement (Internal to the specific organization) Blue Cross Blue Shield of North Carolina https://www.bcbsnc.com/assets/providers/public/pdfs/specialty_methodology.pdf |

4a.1. For each CURRENT use, checked above, provide:

- Name of program and sponsor
- Purpose
- Geographic area and number and percentage of accountable entities and patients included

Measures associated to potentially avoidable complications (PACs) are in use today with some private sector payers and gaining further acceptance among a wide variety of organizations across the health system (public and private payers, clinicians, consultants, all-payer claims database stewards, etc.) [1-8]. They are being used in various capacities in different pilot site implementations. To name a few:

- BCBSA (Blue Cross Blue Shield Association) – uses them for their Centers of Excellence (COE) programs: Blue Distinction
- BCBSNC (Blue Cross Blue Shield of North Carolina) – is using them for tiering providers

In addition, the PAC measures are incorporated by the following organizations in their bundled payment programs:

- BCBSSC – for CABG and PCI programs
- Horizon BCBSNJ– for CHF and CABG programs
- BCBSNC
- PEBTF in PA

<http://www.ajmc.com/interviews/Lili-Brillstein-on-How-Bundled-Payments-Are-Tranforming-Healthcare>

In these programs they look at PACs related to the measure for process improvement activities and for practice re-engineering.

We have created reports for rates of PACs for the following organizations:

- Vermont Payment Reform
- Maine Health Management Coalition
- WellPoint / Anthem CT
- NY State Medicaid
- CT Medicaid
- CO All-payer Claims Database, Center for Improving Value in Health Care

There are several companies that are leveraging these measures to create analytics and software for customers – these include HealthQx, Aver Informatics, McKesson, and TriZetto.

Below are some references that highlight our work with Potentially Avoidable Complications (PACs):

- 1.Hibbard JH, Greene J, Sofaer S, Firminger K, and Hirsh J. Experiment shows that a well-designed report on costs and quality can help consumers choose high value health care. Health Affairs, 31, no.3 (2012):560-568 (doi: 10.1377/hlthaff.2011.1168)
- 2.Rastogi A, de Brantes F, Costley J, and Tompkins C. HCI3 Improving Incentives Issue Brief – Analysis of Medicare and Commercial

Insurer-Paid Total Knee Replacement Reveals Opportunity for Cost Reduction. Available from: <http://www.hci3.org/content/hci3-improving-incentives-issue-brief-analysis-medicare-and-commercial-insurer-paid-total-kn>, Accessed Jun 1 2015.

3.de Brantes F, Rastogi A, and Sorensen CM. Episode of Care Analysis Reveals Sources of Variation in Costs. *Am J Manag Care*. 2011; 17(10): e383-e392.

4.de Brantes F, Rastogi A, and Painter M. Reducing Potentially Avoidable Complications in Patients with Chronic Diseases: The Prometheus Payment Approach. *Health Services Research* 2010; 45(6), Part II: 1854-1871.

5.Pierre L. Yong and LeighAnne Olsen. The Healthcare Imperative: Lowering Costs and Improving Outcomes: Workshop Series Summary; Roundtable on Evidence-Based Medicine; Institute of Medicine. 2010. ISBN: 0-309-14434-5, <http://www.nap.edu/catalog/12750.html>, accessed June 14, 2015.

6.Pham HH, Ginsburg PB, Lake TK, and Maxfield MM. Episode-based Payments: Charting a course for Health care Payment Reform. National Institute for Health Care Reform. Policy Analysis, No.1. Jan 2010. Available from: http://www.nihcr.org/Episode_Based_Payments.html. Accessed Jun 1 2015.

7.François de Brantes, M.S., M.B.A., Meredith B. Rosenthal, Ph.D., and Michael Painter, J.D., M.D. Building a Bridge from Fragmentation to Accountability —The Prometheus Payment Model. *NEJM* 2009; 361:1033 (Perspective)

8.de Brantes F, D’Andrea G, Rosenthal MB. Should health care come with a warranty? *Health Aff (Millwood)* 2009; 28:w678-w687.

4a.2. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)

N/A

4a.3. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)

Measures associated with PACs are currently in use as described in the prior section. In addition, we are working with several not-for-profit and for-profit organizations to provide them with the algorithms needed to calculate rates of potentially avoidable complications. Some of these organizations include:

Fair Health – based in NY and whose mission is to increase transparency of provider cost and quality,
 CastLight – based in CA and serving large employers. We currently provide CastLight with Bridges To Excellence recognitions and will work with them to augment provider transparency by using PAC measures,
 MA APCD (Massachusetts All Payers Claims Database) Council – we currently have an agreement in place with the MA APCD Council to produce PAC measures on hospitals and physicians and report back to the council with tests of reliability and validity of the measures. The purpose is to authorize the publication of these measures,
 Maryland Health Care Cost Commission – we have a two year agreement to produce measures of cost and quality for public dissemination.

In Dec 2014, the measure was conditionally approved by MAP (Measure Applications Partnership), for use in Medicare’s Inpatient Quality Reporting program, and continues to be pushed by organizations like the Consumer-Purchaser Alliance for that purpose.

4b. Improvement

Progress toward achieving the goal of high-quality, efficient healthcare for individuals or populations is demonstrated. If not in use for performance improvement at the time of initial endorsement, then a credible rationale describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

4b.1. Progress on Improvement. (Not required for initial endorsement unless available.)

Performance results on this measure (current and over time) should be provided in 1b.2 and 1b.4. Discuss:

- Progress (trends in performance results, number and percentage of people receiving high-quality healthcare)
- Geographic area and number and percentage of accountable entities and patients included

We do not have any public information to share about the improvements in rates of potentially avoidable complications, as the implementation of these measures is too recent to provide valid comparisons. Further, some of the definitions of PACs have changed since the measures were initially endorsed, making comparisons even more difficult and unreliable.

Nevertheless, the variation in performance scores presented in Section 1b.2 indicates that there are differences between providers in their risk-adjusted PAC rates (higher scores equal worse performance). This suggests that real opportunities exist to identify lower performing providers and reduce the overall occurrence of PACs.

4b.2. If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

Performance results provide summary PACs rates by provider, which can be used by payers and providers in a number of ways to improve the quality of care.

From the payer perspective, payers can use this information to 1) create a high-value provider networks, 2) work with high-value providers to share best practices, 3) incentivize low-value providers to improve, 4) modify their insurance design to activate consumers to select the right care from the right providers at the right time.

From the provider perspective, providers can 1) view services and activity for their patients longitudinally across the entire care continuum, such as frequency of readmissions and ED visits and drill down on patients with high PAC rates, 2) review actionable drill down reports to identify the most frequent PACs across all patients to create care pathways and process improvement plans to impact the most frequent PACs.

4c. Unintended Consequences

The benefits of the performance measure in facilitating progress toward achieving high-quality, efficient healthcare for individuals or populations outweigh evidence of unintended negative consequences to individuals or populations (if such evidence exists).

4c.1. Were any unintended negative consequences to individuals or populations identified during testing; OR has evidence of unintended negative consequences to individuals or populations been reported since implementation? If so, identify the negative unintended consequences and describe how benefits outweigh them or actions taken to mitigate them.

No unintended consequences were reported, but there is the potential for:

1. Under-coding of PACs in the claim stream resulting in under-reporting the actual rate and/or providers gaming the measures
2. Payers calculating the measures even with inadequate sample sizes and using the results to penalize providers

The measure is designed for transparency efforts and to spur quality improvement. Detailed PAC reports can help providers identify areas of quality improvement. Even detailed reports of small samples of patients can be helpful for quality improvement purposes, but not for public reporting. To mitigate the potential for invalid provider comparisons, we specify in this submission the minimum sample size needed to ensure the reliability of a provider's score. Ultimately, there isn't any good way to prevent provider gaming of the measure by under-coding claims, however, under the current DRG payment methodology, many providers would be penalized by under-coding PACs since these codes often result in the assignment of more complicated DRGs.

5. Comparison to Related or Competing Measures

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure.

5. Relation to Other NQF-endorsed Measures

Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.
Yes

5.1a. List of related or competing measures (selected from NQF-endorsed measures)

0141 : Patient Fall Rate

0202 : Falls with injury

0337 : Pressure Ulcer Rate (PDI 2)

0450 : Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate (PSI 12)
 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.
 0705 : Proportion of Patients Hospitalized with Stroke that have a Potentially Avoidable Complication (during the Index Stay or in the 30-day Post-Discharge Period)
 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window)
 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year.
 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

5.1b. If related or competing measures are not NQF endorsed please indicate measure title and steward.

-0531 Patient Safety for Selected Indicators (Composite Measure, Endorsed)(AHRQ)
 -CMS defined hospital acquired conditions (HACs) are a subset of our PACs. We have painstakingly matched the definitions to provide as much consistency as possible. <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalRHQDAPU.html>

5a. Harmonization

The measure specifications are harmonized with related measures;

OR

The differences in specifications are justified

5a.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):

Are the measure specifications completely harmonized?

No

5a.2. If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.

Some of the measures listed in the prior section are, fully harmonized with the submitted measure, in particular, 0705, 0708, and 0709. Other measures such as 0531, 0450, 0337, 0141, 0202 are in fact, subsets of our measure. However, there are some measures that are not harmonized, in particular the 30-day all-cause readmission measure or the Hospital wide all-cause readmission measure. While the submitted PAC measures include hospitalizations and readmissions that occur during the episode time window, the hospitalizations, by definition, have to be relevant to the index event. While 30-day all-cause readmissions might make sense in a Medicare population, it is not self-evident that they do for commercial or Medicaid populations. However, that said, our data suggest that there are, in fact, very few readmissions within 30 days post discharge that aren't relevant to the index hospitalization. It is worth noting that there is some mounting controversy about the 30 day all cause readmission measures and some data suggest that these measures might have simply pushed out certain readmissions to 31 or more days post discharge. Irrespective of these points, PACs include readmissions and are designed to enable accountability at the locus of provider control as well as some shared accountability between settings, centered around a patient, and for a specific medical episode of care. In that sense, they are consistent with the all-cause 30-day readmission rates, but represent a subset of those admissions. As such, the PAC measures, as submitted, don't create added burden of reporting because the readmissions reported are simply a part of the broader 30-day all-cause readmission measures already endorsed by NQF. Because PAC measures are comprehensive, they include patient safety events that can occur during the stay, as well as adverse events, including readmissions, that can occur post-discharge. As a result, they provide facilities and physicians with an overall measure of avoidable complications for a specific medical episode. The data collection for all of the HCI3 measures is automated by a software package and is fully harmonized with all other PAC measures. A single download automates creation of all reports related to each of the PAC measures.

5b. Competing Measures

The measure is superior to competing measures (e.g., is a more valid or efficient way to measure);

OR

Multiple measures are justified.

5b.1. If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s):

Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)

PAC measures are composite measures representing “all-cause harms”. They look at many “care defects” comprehensively. They are composed of several cross-cutting measures and together they paint a global picture of the provider’s overall performance. PACs may occur any time during the episode time window. Furthermore, the measure is constructed so that the occurrence of any number of PACs during a defined episode would only count as one occurrence. PACs look at readmissions, emergency room visits, adverse events due to errors of omission or commission. They look at complications that are due to patient safety failures, and also those directly related to the index condition. These are all a cause of significant waste and quality concerns. As such, the measure can provide clinicians with an overall and comprehensive view, in one measure, of all potentially avoidable complications for a patient and drive quality improvement efforts.

For clinicians and facilities increasingly engaged in value-based payment efforts and/or driving quality improvement for population health, the value of a PAC measure over a series of related, but more discrete measures, is that one can better determine if the sources of complications primarily stem from activities within the facility or outside the facility, and the specific nature of the complications that have a higher frequency of occurrence. While individual components of the PAC measure may have small frequencies and may be difficult to interpret with regards to provider performance or actionability, aggregating all the PACs into a comprehensive, composite measure provides the parsimony that is so desirable. For providers, it’s far easier to construct a quality dashboard from a parsimonious set of measures, and that’s what PAC measures offer.

Further, as a comprehensive outcome measure, PACs are also useful for public transparency of quality, as substantiated by the research from Judy Hibbard and colleagues previously cited in the “testing” section of this submission. As a comprehensive outcome measure, they are easier to explain to the average consumer. From a patient’s point of view, any bad outcome has an impact on their health with respect to return to work, functional limitations and need for additional support. If a provider has a high PAC rate with regards to one component PAC but not the other PACs, the impact on the patient is still adverse. In selecting providers, individual component PAC scores would mean nothing to a patient, but aggregating it to a comprehensive quality score could be a measure of “all-cause” harms and easier to interpret and act on.

Appendix

A.1 Supplemental materials may be provided in an appendix. All supplemental materials (such as data collection instrument or methodology reports) should be organized in one file with a table of contents or bookmarks. If material pertains to a specific submission form number, that should be indicated. Requested information should be provided in the submission form and required attachments. There is no guarantee that supplemental materials will be reviewed.

Attachment Attachment: [PACs_and_Severity_Adjustment_Fact_Sheet_UPDATED-635757123093473851.pdf](#)

Contact Information

Co.1 Measure Steward (Intellectual Property Owner): Health Care Incentives Improvement Institute Inc. (HCI3)

Co.2 Point of Contact: Francois, de Brantes, francois.debrantes@hci3.org, 203-270-2906-

Co.3 Measure Developer if different from Measure Steward: Health Care Incentives Improvement Institute Inc. (HCI3)

Co.4 Point of Contact: Amita, Rastogi, amita.rastogi@hci3.org, 219-934-9624-

Additional Information

Ad.1 Workgroup/Expert Panel involved in measure development

Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.

From 2006 onwards, and under the auspices of various funding organizations, HCI3 has convened and managed, or helped to convene and manage, Clinical Working Groups to inform the development and refinement of the measures. For example, in 2011, 2012 and 2013, HCI3 worked collaboratively with the American Board of Medical Specialties and the American Medical Association’s Physicians Consortium for Performance Improvement, under a federal contract, to convene and get input from various clinical experts on definitions of episodes of care and their sequelae, including avoidable complications.

Some of the clinical experts that have contributed to our work include:

-Dr. John Allen, American Gastroenterology Association (AGA)

-Dr. Morton Arnsdorf, Cardiologist, University of Chicago, IL

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-Dr. Peter Bach, Memorial Sloan Kettering Cancer Center (MSKCC)
 -Dr. Peter Basch, Primary Care, Medstar Health, DC
 -Dr. Justin Beckelman, Radiation Oncology, University of Pennsylvania, PA
 -Dr. Debra Bingham, Executive Director, California Maternal Quality Care Collaborative (CMQCC) at Stanford University, CA
 -Dr. John Birkmeyer, American Society of Metabolic and Bariatric Surgery (ASMBS)
 -Dr. Linda Bosserman, Wilshire Oncology Medical Group, CA
 -Dr. Matthew Brengman, American Society of Metabolic and Bariatric Surgery (ASBMS)
 -Dr. Joel Brill, American Gastroenterology Association (AGA)
 -Dr. George Cautilli, Cautilli Orthopedic Surgical Specialists PC, Yardley, PA
 -Dr. Ashwini Davison, Internist, Johns Hopkins Hospital, MD
 -Dr. James Denny, III, American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS)
 -Dr. Chris Gallagher, American Society of Metabolic and Bariatric Surgery (ASMBS)
 -Dr. Robert Haralson, III, American Academy of Orthopedic Surgeons (AAOS)
 -Ms. Dawn Holcombe, Executive Director, Connecticut Oncology Association, CT
 -Dr. Colin Howden, American Gastroenterology Association (AGA)
 -Dr. John Knightly, American Association of Neurological Surgeons (AANS)
 -Dr. Larry Kosinski, American Gastroenterology Association (AGA)
 -Dr. Nalini Krishnan, Obstetrics & Gynecology, MN
 -Dr. Kelly Kyanko, Internist, NYU School of Medicine, NY
 -Dr. Tara Lagu, Internist & Infectious Disease, Baystate Medical Center, MA
 -Dr. Robert Lee, Society of Thoracic Surgeons (STS)
 -Dr. Alex Little, Society of Thoracic Surgeons (STS)
 -Dr. Michael London, Orthopedic Surgeon, OMNI Orthopedics, OH
 -Dr. Elliott Main, Obstetrics & Gynecology, California Pacific Medical Center, CA
 -Dr. Constantine Mantz, 21st Century Oncology, FL
 -Dr. Joseph Messer, Cardiologist, Rush University Medical Center, IL
 -Dr. David Metz, American Gastroenterology Association (AGA)
 -Dr. Ronald Nahass, Infectious Disease Care, NJ
 -Dr. Ajay Nehra, Urologist, Rush University Medical Center, IL
 -Dr. Francis Nichols, Society of Thoracic Surgeons (STS)
 -Dr. Patrick O'Connor, Primary Care, HealthPartners, MN
 -Dr. Sara Perkel, National Comprehensive Cancer Network, PA
 -Dr. David Peura, American Gastroenterology Association (AGA)
 -Dr. John Ratliff, American Association of Neurological Surgeons (AANS)
 -Dr. Steven Schutzer, Connecticut Joint Replacement Institute, CT
 -Dr. Leif Solberg, Primary Care, HealthPartners, MN
 -Dr. Scott Sporer, Midwest Orthopedics at Rush, Chicago IL
 -Dr. Bonnie Weiner, Cardiologist, Worcester Medical Center, MA
 -Dr. Jonathan Weiner, Bariatric Surgery codes, Prof of Health Policy and Management, Johns Hopkins University, MD
 -Dr. Janet Wright, Cardiologist, Northstate Cardiology Consultants, CA

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 Year the measure was first released: 2008

Ad.3 Month and Year of most recent revision: 01, 2014

Ad.4 What is your frequency for review/update of this measure? Yearly

Ad.5 When is the next scheduled review/update for this measure? 06, 2016

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Ad.7 Disclaimers:

Ad.8 Additional Information/Comments: