NATIONAL QUALITY FORUM

Measure Information

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 sub criterion 1b).

Brief Measure Information

NQF #: 2747
Corresponding Measures:
De.2. **Measure Title:** Proportion of Patients with Heart Failure (HF) that have a Potentially Avoidable Complication (during the episode time window)
Co.1.1. **Measure Steward:** Altarum Institute
De.3. **Brief Description of Measure:** Percent of adult population aged 18 + years with heart failure (HF) who are followed for at least one-year and have one or more potentially avoidable complications (PACs) during the most recent 12 months. Please reference attached document labeled NQF_HF_all_codes_risk_adjustment_01.25.17.xls, in the tabs labeled PACs I-9 and PAC I-10 for a list of code definitions of PACs relevant to HF.
We define PACs as one of two types:
(1) Type 1 PACs - PACs related to the index condition: Patients are considered to have a PAC, if they receive services during the episode time window for any of the complications directly related to HF, such as for hypotension, acute heart failure, fluid and electrolyte disturbances etc.
(2) Type 2 PACs - PACs related to Patient Safety or broader System Failures: Patients are also considered to have a PAC, if they receive services during the episode time window for any of the complications related to patient safety or health system failures such as for sepsis, infections, phlebitis, deep vein thrombosis, pressure sores etc.

All relevant admissions in a patient with HF are considered potentially avoidable and flagged as PACs. This particularly applies to hospitalizations due to acute exacerbations of the index condition. For example, a hospitalization for acute pulmonary edema in a heart failure patient is considered a PAC.

PACs are counted as a dichotomous (yes/no) outcome. If a patient had one or more PACs in the most recent 12 months, they get counted as a "yes" or a 1. The "PAC overview" tab in the enclosed workbook labeled NQF_HF_all_codes_risk_adjustment_01.25.17.xls gives the percent of HF episodes that have a PAC and the tab labeled "PAC drill down" gives the types of PACs and their frequencies in HF episodes within this dataset. The Decision Tree tab in the same workbook highlights the flow diagrams for the selection of patients with HF for this measure.

The information is based on a two-year claims database from a commercial insurer. The database had over 3.2 million covered lives and over $25.9 billion in "allowed amounts" for claims costs. The database is an administrative claims database with medical as well as pharmacy claims.
1b.1. **Developer Rationale:** 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 40% of its plan members with heart failure 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. Although use of administrative claims data in identifying conditions and measuring provider quality has been questioned, there are several studies in literature that acknowledge the 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 still prevalent fee for service payment system, services for most PACs are rewarded by continued payment (except the CMS defined "never events") making adverse events surface in billing data. Claims based PAC measures therefore serve as a valid method to track adverse outcomes that do occur (Leibson 2008).

References:

1) deBrantes F, Rastogi A, and Painter M. "Reducing Potentially Avoidable Complications in Patients with Chronic Diseases: The Prometheus Payment Approach." Health Serv Res 45.6.2 (2010 Dec): 1854-1871. doi: 10.1111/j.1475-6773.2010.01136x

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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) BCBSNC: 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 (HIPP): http://www.cbghealth.org/projects/reducing-costs/healthcare-incentives-payment-pilot-hipp/

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12) Cassel, Christine, MD et al. "Getting More Performance from Performance Measurement." New England Journal of Medicine 371 (2014): 2145-147. Web.

13) Normand, Sharon-Lise T., Yun Wang, and Harlan M. Krumholz. "Assessing Surrogacy of Data Sources for Institutional Comparisons." Health Services and Outcomes Research Methodology Health Serv Outcomes Res Method 7.1-2 (2007): 79-96. Web.

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/1ijI5Ar, Last accessed June 29 2015.

17) Leibson CL1, Needleman J, Buerhaus P, Heit JA, Melton LJ 3rd, Naessens JM, Bailey KR, Petterson TM, Ransom JE, Harris MR. Identifying in-hospital venous thromboembolism (VTE): a comparison of claims-based approaches with the Rochester Epidemiology Project VTE cohort. Med Care. 2008 Feb;46(2):127-32. doi: 10.1097/MLR.0b013e3181589b92.

S.4. **Numerator Statement:** Outcome: Number of patients with heart failure (HF), who have one or more potentially avoidable complications (PACs) during the most recent 12 months.
S.6. **Denominator Statement:** Adult patients aged 18 years and above with an episode of heart failure (HF) and are followed for at least 12 months.
S.8. **Denominator Exclusions:** Patients are excluded from the measure if they are less than 18 years of age, have an incomplete episode of care (less than 18 months of claims), have an enrollment gap of more than 30 days, or have outlier costs for the most recent 12months of claim costs.
Claims are excluded from the episode if they are for services that are not relevant for care of heart failure.

De.1. **Measure Type:** Outcome
S.17. **Data Source:** Claims
S.20. **Level of Analysis:** Clinician : Group/Practice

IF Endorsement Maintenance – Original Endorsement Date: Most Recent Endorsement Date:

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. **IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results?** Not applicable

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 sub criteria to pass this criterion and be evaluated against the remaining criteria.***

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form
2747_HF_Evidence_Attachment_Altarum.docx
1a.1 For Maintenance of Endorsement: Is there new evidence about the measure since the last update/submission?
Please update any changes in the evidence attachment in red. Do not remove any existing information. If there have been any changes to evidence, the Committee will consider the new evidence. If there is no new evidence, no updating of the evidence information is needed.

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., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)*
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.)
IF a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and provide rationale for composite in question 1c.3 on the composite tab.
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References:

1) deBrantes F, Rastogi A, and Painter M. "Reducing Potentially Avoidable Complications in Patients with Chronic Diseases: The Prometheus Payment Approach." Health Serv Res 45.6.2 (2010 Dec): 1854-1871. doi: 10.1111/j.1475-6773.2010.01136x

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Project VTE cohort. Med Care. 2008 Feb;46(2):127-32. doi: 10.1097/MLR.0b013e3181589b92.

1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. *(This is required for maintenance of endorsement. 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 include.) This information also will be used to address the sub-criterion on improvement (4b) 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 6,025 episodes of HF.

Because providers with small volumes may provide unreliable estimates, we excluded any with fewer than 10 attributed episodes prior to the calculations. After this exclusion 81 (out of 2110) providers remained. Performance scores of these providers are summarized in the following table:

Unadjusted PAC Rates:
- Median (IQR): 41% (31%, 57%)
- Range: 9% - 80%

Risk-Standardized PAC Rates (RSPR):
- Median (IQR): 40% (32%, 46%)
- Range: 14% - 68%

Please refer to the NQF_HF_all_codes_risk_adjustment 01.25.17.xls workbook under the "Provider Attribution" tab to see specific results for each provider group.

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.

While HF has been noted as the most common indication for hospitalization for adults 65 and older, a prospective randomized trial showed a 56.2% reduction in the number of readmissions for heart failure due to intensive nurse-directed education, care coordination, and follow up (Rich 1995). This study also showed that the reduction of hospital admissions led to a savings of $460 per patient. Moreover, improved hospital and post-discharge care including pre-discharge planning, home-based follow-up, and patient education, have all demonstrated decrease in heart failure related readmission rates suggesting that healthcare services / care processes influence outcomes in heart failure patients (Krumholz 2002).

Even so, published literature continues to point out that discharge from a heart failure hospitalization is followed by a readmission within 30 days in approximately 24% of cases (Desai 2012) with more than 50% patients readmitted to hospital within 6 months of discharge (Ross 2010)). This suggests less than optimal performance and sufficient room for continued improvement.

Many heart failure (HF) hospitalizations are considered potentially preventable and can be attributed to care failures in the management and treatment of HF in outpatient settings (Will 2012). The American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA) have jointly produced and updated guidelines for management of cardiovascular disease since 1980. The latest Heart Failure guideline released in 2013 states, "Adherence to the clinical practice guidelines herein reproduced should lead to improved patient outcomes" (Yancy 2013).

These outcomes should include a reduction in PACs in HF patients such as a reduction in hospitalizations for HF and other morbidities associated with the progression of HF. While our analyses show that readmission rates for heart failure patients are lower (5%) than they were a few years ago, the overall PAC rate for patients with HF continues to be high (over 42%) mostly driven by high PAC counts in professional claims (over 40%). Even though eliminating all PACs may not be feasible, identifying their magnitude and understanding their causality for the most frequent or the most expensive could lead to improving patient outcomes (de Brantes 2008) (de Brantes 2010).

References:

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7) de Brantes F and Rastogi A. "Evidence-Informed Case Rates: Paying for Safer, More Reliable Care." The Commonwealth Fund 40 1146 (2008): 1-14.

8) de Brantes F, Rastogi A, and Painter M. "Reducing Potentially Avoidable Complications in Patients with Chronic Diseases: The Prometheus Payment Approach". Health Services Research 45.6.2 (2010): 1854-1871.

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 maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.) For measures that show high levels of performance, i.e., "topped out", disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b) under Usability and Use.*

We recommend that PAC rates be calculated for each studied dataset, and in particular separating Medicaid from commercial and from Medicare datasets. That's because the frequency of PACs is partially a function of social and demographic factors affecting the patients, in addition to the ability of the health system to organize itself around the patient's needs.

We used commercial and Medicaid data sets covering individuals from the state and time period (2012-2013) to compare adjusted PAC rates in each population. Our analysis found that, among patients with HF, the rate of PACs in the Medicaid population was higher than the rate observed for the commercial population (72% vs 57%, respectively). This difference is similar to comparisons we have done in the past.

1b.5. **If no or limited data on disparities from the measure as specified is reported in 1b.4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations. Not necessary if performance data provided in 1b.4**

The literature has ample examples of care disparities, including the most recent paper on a long-standing implementation of the Alternative Quality Contract in Massachusetts that shows a continuous gap in financial and medical outcomes for patients of lower social and income status than those in the upper income levels (Song 2017). A prior seminal report by the Institute of Medicine (IOM) in 2002 showed disparities exist in virtually all clinical settings and across a wide range of disease areas and clinical services. It noted in particular, disparities in cardiovascular care, even after adjusting for patient demographics and comorbidities. The report exposed bias (prejudice), uncertainty and stereotyping by well-meaning and highly educated professionals as an underlying cause. The IOM Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care recommended steps be taken towards patient education to access care, provider education to increase awareness of disparities, and monitoring of progress towards elimination of healthcare disparities. (Smedley 2002, Nelson 2003).

Specific to heart failure patients, Vaccarino et al reported that elderly women with HF tend to receive less evidence-based treatment (Vaccarino 1999) than men. Using the Nationwide Hospital Discharge Survey Data from 1995-2009, Will et al showed that hospitalization rates in HF patients were significantly higher in blacks than in whites ($p<0.05$) and that preventable hospitalizations rates were declining in whites more than in blacks (Will 2012).

Another study looked at the factors precipitating hospital admissions for HF and found that readmissions could be influenced by psychosocial and socioeconomic barriers that limit compliance with medications, life style changes, self-monitoring and appropriate follow up (Fonarow 2008). There is also a tendency for higher readmissions in centers with resource limitations such as lower nurse staffing levels and limited cardiac capabilities (Joynt 2011). Furthermore, patients with HF living in skilled nursing facilities are at higher risk of adverse events (Allen 2011) and community dwelling patients with HF are often unable to afford the expensive heart failure medications prescribed leading to poor compliance and poor control (Dunlay 2011).

Another impressive study by Foraker et al showed that patients with HF and a high burden of comorbidity, living in low neighborhood medical household income (nINC) areas, had a higher hazard of all-cause re-hospitalizations and increased rates of hospitalizations or death compared to those who lived in high-nINC areas. Additionally, the authors found that Medicaid recipients with HF and low comorbidity burden had an increased hazard of death or re-hospitalizations compared to non-Medicaid recipients. They suggest that nINC determines, in part the availability of healthcare resources in the community, and may adversely affect access to care and out-of-hospital monitoring of patients with HF living in low-nINC areas (Foraker 2011).

As a result, racial and ethnic minority populations confront significant barriers to cardiovascular diagnosis and care, receive lower quality treatment and experience worse health outcomes than their white counterparts (Bonow 2005, AHA: Bridging the gap. CVD Health Disparities). As such, the PAC measure is well suited to help address these disparities because there is likely to be a higher PAC rate for patients who currently are experiencing these disparities. Over time, lowering PAC rates has to include a comprehensive approach to reducing disparities and providers that address the issue will end up with lower PAC rates than those that don't.

References:

1. Song Z, Rose S, Chernew ME, Safran DG, Lower- Versus Higher-Income Populations In The Alternative Quality Contract: Improved Quality And Similar Spending. Health Affairs, January 2017 36:174-82.
2. Smedley BD, Stith AY, Nelson AR, eds. Unequal treatment: Confronting racial and ethnic disparities in health care. IOM (Institute of Medicine Report) Washington, DC: National Academy Press, 2002.
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12. AHA: Bridging the gap. CVD Health Disparities: http://www.heart.org/idc/groups/heart-public/@wcm/@hcm/@ml/documents/downloadable/ucm_429240.pdf Accessed Jan 29 2017.

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 sub criteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.***

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 : Congestive Heart Failure

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

De.7. Target Population Category *(Check all the populations for which the measure is specified and tested if any):*
Adolescents, Adults, Elderly, Populations at Risk, Populations at Risk : Dual eligible beneficiaries, Populations at Risk : Individuals with multiple chronic conditions, Populations at Risk : Veterans

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=5.4.003&name=HF

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_HF_all_codes_risk_adjustment_01.25.17-636213723062282570.xlsx

S.3.1. For maintenance of endorsement: Are there changes to the specifications since the last updates/submission. If yes, update the specifications for S1-2 and S4-22 and explain reasons for the changes in S3.2.

S.3.2. For maintenance of endorsement, please briefly describe any important changes to the measure specifications since last measure update and explain the reasons.
Not applicable

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) DO NOT include the rationale for the measure.*
IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).
Outcome: Number of patients with heart failure (HF), who have one or more potentially avoidable complications (PACs) during the most recent 12 months.

S.5. 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, time period for data collection, 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 (S.14).
Patients with a HF episode, that were identified as having services that included a potentially avoidable complications (PACs) diagnosis code during the most recent 12 months of the episode. The enclosed excel workbook entitled NQF_HF_all_codes_risk_adjustment_01.25.17gives the detailed codes for PACs in the tab entitled PACs I-9s & I-10s. In the PAC tab, a PAC group name is given in column B, PAC type in column C, PAC ICD-9 diagnosis codes in column D and PAC ICD-10 diagnosis

codes in column E. PACs are identified only based on diagnosis codes.

Services for PACs are identified as follows:
a. Any service (professional, outpatient facility, ancillary) that is relevant to HF and has a PAC code in any position on the claim
b. Any admission to an inpatient facility, that has a diagnosis code in the principal position that is relevant to HF

S.6. **Denominator Statement** *(Brief, narrative description of the target population being measured)*
Adult patients aged 18 years and above with an episode of heart failure (HF) and are followed for at least 12 months.

S.7. **Denominator Details** *(All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, 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 target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).
Please refer to the enclosed excel workbook entitled NQF_HF_all_codes_risk_adjustment 01.25.17- tab entitled "Triggers I-9 & I-10"

The target population is identified using the following criteria:

Using administrative claims database, patients with HF are identified using one of the following trigger criteria:
a. Patients having an office visit with a trigger diagnosis code of HF, in any position, followed by a second confirmatory claim at least 30 days later that could be an office visit, or an outpatient facility claim (with a trigger diagnosis code of HF in any position), or an inpatient stay claim (with a trigger code of HF in the principal position).
b. Patients having an emergency department visit with a trigger diagnosis code of HF in any position.
c. Patients with an acute care facility claim with a trigger diagnosis code of HF in the principal position.

Inclusion criteria: Patients identified to have HF based on the trigger criteria listed above are retained in the measure if they meet the following inclusion criteria:
1. The patient has continuous enrollment for the entire time window, with no more than a 30-day enrollment gap.
2. The patient has at least 18 months of claims in the database.
3. Patient is at least 18 years of age

Once the episode is triggered all relevant claims are assigned to the episode. Relevant claims include 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. Services that contain a PAC code and that are assigned to a HF episode will be flagged as a potentially avoidable complication.

S.8. **Denominator Exclusions** *(Brief narrative description of exclusions from the target population)*
Patients are excluded from the measure if they are less than 18 years of age, have an incomplete episode of care (less than 18 months of claims), have an enrollment gap of more than 30 days, or have outlier costs for the most recent 12months of claim costs. Claims are excluded from the episode if they are for services that are not relevant for care of heart failure.

S.9. **Denominator Exclusion Details** *(All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, 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 could be due to exclusion of either patients and / or claims:
Please refer to the enclosed excel workbook entitled (NQF_HF_all_codes_risk_adjustment 01.25.17.xls) – tab entitled Decision Tree

1. Patients are excluded from the measure if they meet one of the following criteria:
a. age is < 18 years
b. gender is missing
c. there is an enrollment gap of more than 30 days during the episode time window
d. there is less than 18 months of claims in the database for a given patient
e. the episode is an outlier, defined as in the 1st or 99th percentile of all episodes.

2. Claims are excluded from a HF episode if they are not considered relevant to the care for the chronic condition, such as trauma related claims, or are for major surgical services.

S.10. **Stratification Information** *(Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – 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.11. **Risk Adjustment Type** (Select type. Provide specifications for risk stratification in measure testing attachment)
Statistical risk model
If other:

S.12. **Type of score:**
Rate/proportion
If other:

S.13. **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.14. **Calculation Algorithm/Measure Logic** (*Diagram or 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; time period for data, aggregating data; risk adjustment; etc.)*
Please refer to the enclosed excel workbook entitled (NQF_HF_all_codes_risk_adjustment 01.25.17.xls).

Identifying the Target Population -- Assembling the Denominator:

Using administrative claims database, patients with HF are identified as those who fulfilled the trigger criteria for HF. Heart Failure patients should have claims that have trigger diagnosis codes as defined in the TRIGGERS tab (Triggers I-9 & I-10) of the enclosed workbook. In addition, they should meet one of the following trigger criteria:
1. Have a hospitalization with a trigger code in the principal position of an inpatient stay claim
2. Have an outpatient facility visit such as an emergency department visit with one of the trigger codes in any position, OR
3. Have a physician visit with a trigger code in any position AND a confirming claim at least 30 days later that could be any of the three below:
- An in-patient stay claim with a trigger diagnosis code of heart failure in the principal position,
- An emergency department visit claim with a trigger code for heart failure in any position or
- Another professional visit claim with a trigger code for heart failure in any position

Patients are retained if they are 18 years of age or more, do not have a missing gender, have continuous enrollment with an enrollment gap of less than 30 days, and have at least 18 months of data in the claims dataset.
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. Hospitalizations carrying diagnosis codes relevant to heart failure, and relevant admissions to post-acute care facilities are also included in the episode. If a patient has more than one concurrent episode open, 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. Therefore, if an inpatient stay claim carried a principal Dx code that matched the trigger diagnosis code for HF 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 HF.

Once all the relevant services are assigned, outlier episodes (those with total episode costs below the 1st percentile or above the 99th percentile) are excluded.

Cases meeting the Outcome -- Assembling the Numerator:
Episodes included in the denominator are flagged as having a PAC (potentially avoidable complication) if:
a. Any claim (professional, outpatient facility, ancillary) that is relevant has a PAC code in any position on the claim
b. Any admission to an inpatient facility, that is relevant to heart failure as identified through a relevant principal diagnosis code
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 pharmacy services are considered typical because the claims don't include diagnosis codes. Episodes that have even a single PAC claim are added to the numerator.

Time-period of data:
The time-period to be analyzed for the measure is the most recent 12 months of a triggered heart failure episode.

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

PAC rate = Patients with HF that have at least one PAC claim / Total number of HF patients

Aggregating Data & Drill Down Calculations:
A flow chart demonstrating the series of steps and the counts of patients at each step is shown in the tab entitled Decision Tree of the enclosed workbook called NQF_HF_all_codes_risk_adjustment01.25.17.xls

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 due to hospitalizations, or in an outpatient facility, or in professional claims. These could be further broken down by the PAC type – type 1 being directly related to HF and so actionable by the managing physician; and type 2 PACs related to patient safety and broader system failures and requiring collaboration among providers. The drill down details identify the highest volume PACs (see tab labeled as "PAC Drill down Graph"). This helps focus strategies in reducing PACs and make the data actionable.

Risk Adjustment:

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 PAC rates are due to factors that could be controlled by all providers that are managing or co-managing the patient, during the entire episode time window.

Once we have the observed PAC rates based on the above calculations, we risk-adjust them for patient factors such as patient demographics, comorbidities collected historically, and for severity of illness using subtypes indicators collected from the trigger claim and / or the 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 PACs (=1) or not (=0).

Independent Variables:
Several patient-related "risk factors" or covariates are included in the model: This list was selected based on input from various clinical experts in clinical working groups. Risk Factors used in the models were:

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_HF_all_codes_risk_adjustment 01.25.17.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., systolic vs. diastolic heart failure). Subtypes are unique to each episode. Please see the tab labeled "Subtypes I-9 & I-10" for a list of subtypes and their corresponding codes in the enclosed workbook called NQF_HF_all_codes_risk_adjustment 01.25.17.xls
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. For each patient, based on their historic risk / severity profile, the "predicted" coefficients from the risk adjustment models are summed to give the "patient-level" predicted probabilities of the occurrence of a PAC.

To prevent unstable coefficients, comorbidities and subtypes are included in the models as covariates if they are present in at least 10 episodes. 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.

The risk adjustment model for heart failure are shown in the enclosed workbook entitled NQF_HF_all_codes_risk_adjustment 01.25.17.xls, tab entitled HF_Risk_Model. All the variables with an n >=10 are retained in the model and the model coefficients are shown, along with their z-scores and p-values. As you may notice some of the covariates such as obesity are collected from both historical claims (risk factors) as well as from the episode trigger date and look-back period of the episode (subtypes).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 group:

Once episodes are constructed they are attributed to the provider group that has the maximum number of E&M claims during the episode time window.
To directly compare PAC rates across provider groups while also appropriately accounting for differences in patient severity, we calculate a risk-standardized PAC rate (RSPR) for each provider group. 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 provider-level measures (i.e., mortality, readmissions, etc.).

1. For each provider group, the actual number of PAC occurrences are summed across all attributed patients, to give the "observed" PAC rates for HF for the provider group.
2. Similarly, patient-level probability estimates are summed across all attributed patients to give "expected" PAC rates for the provider group.
3. The observed sum is then divided by the summed probabilities (O/E). This number yields whether the provider group 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 provider groups, the O/E ratio is multiplied by the overall expected PAC rate across all provider groups, to obtain the risk-standardized PAC rate (RSPR) for the group.

The formula for this calculation is as follows:
RSPR_j={(SUM Observed_ij)/(SUM Prob_ij)} × {(SUM Prob_i) / (# of episodes)}
Where an individual i is attributed to the unit of attribution j (e.g., physician group)

The risk-standardized PAC rate (RSPR) therefore adjusts the provider group's observed PAC rate, by the severity of its patients. It represents what a provider group's PAC rate would be if its patient population was reflective of the overall population, leveling the playing field, and allowing for meaningful comparisons across all groups adjusted similarly.
This is what we call RSPR (risk standardized PAC rate) and is used for provider group outcomes comparisons.

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, or even a general lack of reliability, in one dataset will apply to another.

S.15. 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.16. Survey/Patient-reported data *(If measure is based on a survey or instrument, provide instructions for data collection 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.17. Data Source *(Check ONLY the sources for which the measure is SPECIFIED AND TESTED).*
If other, please describe in S.18.
Claims

S.18. Data Source or Collection Instrument *(Identify the specific data source/data collection instrument (e.g. name of database, clinical registry, collection instrument, etc., and describe how data is collected.)*
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 over 3.2 million 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.

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.
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.

No data collection instrument was used.

S.19. 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

S.20. Level of Analysis *(Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)*
Clinician : Group/Practice

S.21. Care Setting *(Check ONLY the settings for which the measure is SPECIFIED AND TESTED)*
Other, Outpatient Services
If other: Across the care continuum

S.22. **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.)*

2. Validity – See attached Measure Testing Submission Form
2747_HF_composite_testing_attachment.docx

2.1 For maintenance of endorsement
Reliability testing: If testing of reliability of the measure score was not presented in prior submission(s), has reliability testing of the measure score been conducted? If yes, please provide results in the Testing attachment. (Do not remove prior testing information – include date of new information in red.)

2.2 For maintenance of endorsement
Has additional empirical validity testing of the measure score been conducted? If yes, please provide results in the Testing attachment. (Do not remove prior testing information – include date of new information in red.)

2.3 For maintenance of endorsement
Risk adjustment: For outcome, resource use, cost, and some process measures, risk-adjustment that includes SDS factors is no longer prohibited during the SDS Trial Period (2015-2016). Please update sections 1.8, 2a2, 2b2, 2b4, and 2b6 in the Testing attachment and S.14 and S.15 in the online submission form in accordance with the requirements for the SDS Trial Period. NOTE: These sections must be updated even if SDS factors are not included in the risk-adjustment strategy. If yes, and your testing attachment does not have the additional questions for the SDS Trial please add these questions to your testing attachment:

What were the patient-level sociodemographic (SDS) variables that were available and analyzed in the data or sample used? For example, patient-reported data (e.g., income, education, language), proxy variables when SDS data are not collected from each patient (e.g. census tract), or patient community characteristics (e.g. percent vacant housing, crime rate).

Describe the conceptual/clinical and statistical methods and criteria used to select patient factors (clinical factors or sociodemographic factors) used in the statistical risk model or for stratification by risk (e.g., potential factors identified in the literature and/or expert panel; regression analysis; statistical significance of p<0.10; correlation of x or higher; patient factors should be present at the start of care)

What were the statistical results of the analyses used to select risk factors?

Describe the analyses and interpretation resulting in the decision to select SDS factors (e.g. prevalence of the factor across measured entities, empirical association with the outcome, contribution of unique variation in the outcome, assessment of between-unit effects and within-unit effects)

3. Feasibility

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.

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).

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:

3b. Electronic Sources

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*) Update this field for **maintenance of endorsement**.
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.** For **maintenance of endorsement**, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

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. Please also complete and attach the NQF Feasibility Score Card.**
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. **Required for maintenance of endorsement. Describe difficulties (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 PRO 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/episodeapi

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.

Specific Plan for Use	Current Use (for current use provide URL)
Public Reporting Professional Certification or Recognition Program	Payment Program Blue Cross Blue Shield of New Jersey https://www.horizonblue.com/ Quality Improvement (Internal to the specific organization) Blue Cross Blue Shield of North Carolina https://www.bcbsnc.com/

4a.1. For each CURRENT use, checked above (update for maintenance of endorsement), provide:

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

Measures associated to potentially avoidable complications (PACs) are in use today with private and public 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

Horizon Blue Cross Blue Shield of New Jersey has been using PACs as part of its on-going alternative payment model implementation for the past 5 years. Some of the results have been captured in a Case Study -- http://www.hci3.org/wp-content/uploads/2016/02/Horizon-Prometheus-Case-Study-4-Feb-2015.pdf.
Comprehensive reports are given to providers to help them identify and reduce the frequency of avoidable complications and lower the costs of managing patients. 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.
New York State's Delivery System Reform Incentive Payment program includes the use of PACs as key performance measures for all providers engaged in Value-based Payment contracts. Reports are generated through the state's Medicaid Data Warehouse, and PAC measures were reviewed and approved by various Clinical Advisory Groups. For more information, see: https://www.health.ny.gov/health_care/medicaid/redesign/dsrip/vbp_reform.htm, and in particular: VBP Roadmap that includes specific references to PACs: https://www.health.ny.gov/health_care/medicaid/redesign/dsrip/2016/2016-jun_annual_update.htm#apxv

We have also created reports for rates of PACs for the following organizations:
-Vermont Payment Reform
-Maine Health Management Coalition
- Anthem CT
-NH's All-payer Claims Database

-CT Medicaid
-CO All-payer Claims Database, Center for Improving Value in Health Care

There are several companies that are leveraging the PAC measures to create analytics and software for customers end users – these include McKesson/HealthQx, Aver Informatics, and TriZetto. These organizations provide detailed reports on PACs to large national and regional payers. In 2017 the Maryland Health Care Commission is releasing comparative data on prices and rates of complications for chronic care and other episodes.

Below are some references that highlight research and findings associated 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.
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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.*)
Not applicable --- See Section 4a.1 above

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. **Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (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.)**
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.
Initial endorsement

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. **Please explain any unexpected findings (positive or negative) during implementation of this measure including unintended impacts on patients.**

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.

4c.2. **Please explain any unexpected benefits from implementation of this measure.**

4d1.1. **Describe how performance results, data, and assistance with interpretation have been provided to those being measured or other users during development or implementation.**
How many and which types of measured entities and/or others were included? If only a sample of measured entities were included, describe the full population and how the sample was selected.

4d1.2. **Describe the process(es) involved, including when/how often results were provided, what data were provided, what educational/explanatory efforts were made, etc.**

4d2.1. **Summarize the feedback on measure performance and implementation from the measured entities and others described in 4d.1.**
Describe how feedback was obtained.

4d2.2. **Summarize the feedback obtained from those being measured.**

4d2.3. **Summarize the feedback obtained from other users**

4d.3. **Describe how the feedback described in 4d.2 has been considered when developing or revising the measure specifications or implementation, including whether the measure was modified and why or why not.**

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)**
0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization
0337 : Pressure Ulcer Rate (PDI 2)
0450 : Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate (PSI 12)
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, AHRQ) (endorsed)
-NQMC 010028: Ambulatory care sensitive conditions (ACSC): age-standardized acute care hospitalization rate for conditions where appropriate ambulatory care prevents or reduces the need for admission to the hospital, per 100,000 population younger than age 75 years. (AHRQ)
-CMS defined hospital acquired conditions (HACs) are a subset of our PACs. We have pain-stakingly 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 of Related Measures

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 harmonized to the extent possible?
No

5a.2. **If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.**
Some measures such as 0337, 0450, and NQMC 010028 are in fact, subsets of our measure and so harmonized. However, there are some measures that are not harmonized, in particular the 30-day all-cause readmission measures and the Hospital wide all-cause readmission measure. While the submitted PAC measure include hospitalizations and readmissions that occur during the episode time window, the hospitalizations, by definition, have to be relevant to the underlying condition. For chronic conditions, most relevant hospitalizations within the entire episode time window are considered potentially avoidable. 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. However, they do extend to the entire episode time window. 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 as well as other adverse events, including hospitalizations and ED visits during the entire continuum of care. As a result, they are a comprehensive measure of avoidable complications for a specific medical episode. The data collection for the 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 most recent 12 months. 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_Altarum.docx

Contact Information

Co.1 **Measure Steward (Intellectual Property Owner):** Altarum Institute
Co.2 **Point of Contact:** Francois, deBrantes, Francois.deBrantes@altarum.org, 734-205-6102-
Co.3 **Measure Developer if different from Measure Steward:** Altarum Institute
Co.4 **Point of Contact:** Amita, Rastogi, amita.rastogi@altarum.org, 734-205-6100-

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, we have 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, we 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. In addition, we received further feedback from the Clinical Validation Groups as part of the NYS DSRIP (New York State's Delivery System Reform Incentive Payment program) effort.

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
-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 Denneny, 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:** 2017

Ad.3 **Month and Year of most recent revision:**

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?** 01, 2018

Ad.7 **Disclaimers:**

Ad.8 **Additional Information/Comments:**