

TO: Aligning Forces Communities

FR: National Committee for Quality Assurance (NCQA)

RE: Summary of Alliance use of Composite Measures

DATE: June 22, 2010

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The National Quality Forum (NQF) defines composite measures as a combination of two or more individual measures into a single measure that results in a single score. Across public and private performance measurement initiatives, the use of composites is becoming a more widely accepted practice for assessing performance. As performance measurement becomes more advanced and more measures are introduced, composite measures provide an opportunity to synthesize multiple related aspects of the health care system and can be used to support health care systems improvements for providers and policy makers.<sup>1</sup> Within the context of Aligning Forces goals, the use of composite measures may be desirable. Aggregating individual indicators into one measure can help simplify complex issues and facilitate consumer understanding and evaluation of performance measures.<sup>2</sup> Studies have also shown that composites, if constructed well, may have better reliability at smaller sample sizes than individual performance measures.<sup>3,4</sup>

Given the potential benefits of reporting composite measures, many Alliances have expressed interest in beginning or expanding the use of composite measures in their public reports. This memo presents an overview of how clinical composite measures are currently being used by Aligning Forces and highlights important issues to consider when deciding to report aggregate measures.

### **Which Composite Measures are Aligning Forces Collecting?**

Four of the fifteen Alliances currently use composite measures in their public reports. These Alliances include: Better Health Greater Cleveland (Cleveland, OH), Community Health Alliance of Humboldt-Del-Norte (Humboldt County, CA), Minnesota Community Measurement (Minnesota), and Wisconsin Collaborative for Healthcare Quality (Wisconsin). See Table 1 for a list of the composite measures the communities currently collect.

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<sup>1</sup> Committee on Redesigning Health Insurance Performance Measures, Payment and Performance Improvement Programs. *Performance Measurement: Accelerating Improvement*. The National Academies Press. 2006.

<sup>2</sup> Asch & Hofer. *Representing overall quality of care: the whole must be more than the sum of the parts*. White Paper: Advancing Quality Measurement Conference, Oct 2008.

<sup>3</sup> Scholle SH, Roski J, Adams JL, Dunn DL, Kerr EA, Dugan DP, Jensen RE. [Benchmarking physician performance: reliability of individual and composite measures](#). *Am J Managed Care*. 2008 Dec;14(12):833-8.

<sup>4</sup> Kaplan SH, Griffith JL, Price LL, Pawlson LG, Greenfield S. Improving the Reliability of Physician Performance Assessment: Identifying the “Physician Effect” on Quality and Creating Composite Measures. *Med Care*. 2009. Apr;47(4):378-87.

Table 1. Composite Measures used by Aligning Forces Alliances

Alliance	Composite Measure	Individual Measures
Cleveland	Diabetes Care Process Standards: <i>the percentage of diabetes patients, ages 18-75, who met all 4 individual measures</i>	<ul style="list-style-type: none"> <li>At least one test for blood sugar control using the “hemoglobin A1c” blood test;</li> <li>Measuring the urine “microalbumin” level or preventing progression of kidney problems by treating with “ACE” inhibitor or “ARB” drugs;</li> <li>Referring the patient for an eye examination to detect early and treatable diabetic eye disease; and</li> <li>Providing a pneumonia (“pneumococcal”) vaccination to avoid preventable lung infections.</li> </ul>
	Diabetes Care Outcome Standards: <i>the percentage of diabetes patients, ages 18-75, who met 4 of 5 individual measures</i>	<ul style="list-style-type: none"> <li>HbA1c good control;</li> <li>Good results on blood tests for “bad” (LDL) cholesterol or treatment with cholesterol-lowering “statin” medications;</li> <li>Good blood pressure levels;</li> <li>Good weight control, measured by the “body mass index”; and</li> <li>Avoidance of cigarette smoking.</li> </ul>
Humboldt	Optimal Diabetes Care: <i>the percentage of diabetes patients, ages 18-75, who met all 3 individual measures</i>	<ul style="list-style-type: none"> <li>HbA1c control (&lt;8.0%)</li> <li>LDL control (&lt;100 mg/dL)</li> <li>Blood pressure control (&lt;140/90 m/Hg)</li> </ul>
Minnesota	Optimal Diabetes Care: <i>the percentage of diabetes patients, ages 18-75, who met all 5 individual measures</i>	<ul style="list-style-type: none"> <li>Maintain blood pressure less than 130/80</li> <li>LDL control (&lt;100 mg/dL)</li> <li>HbA1c control (&lt;7.0%)</li> <li>Documented tobacco free</li> <li>Take an aspirin daily, for those ages 40 and up</li> </ul>
	Optimal Vascular Care: <i>the percentage of vascular disease patients, ages 18-75, who met all 4 individual measures</i>	<ul style="list-style-type: none"> <li>Blood pressure control (&lt;130/80 m/Hg)</li> <li>LDL control (&lt;100 mg/dL)</li> <li>Document tobacco free</li> <li>Take an aspirin daily, for those ages 40 and up</li> </ul>
	Cancer Screening: <i>the percentage of adults, ages 51-80, who received all of the appropriate cancer tests</i>	<p><u>For women, this measure includes getting tested for:</u></p> <ul style="list-style-type: none"> <li>Breast Cancer</li> <li>Cervical Cancer</li> <li>Colorectal Cancer</li> </ul> <p><u>For men, this measure includes getting tested for:</u></p> <ul style="list-style-type: none"> <li>Colorectal Cancer</li> </ul>
	Childhood Immunization: <i>the percentage of children who received all vaccinations by the age of 2</i>	<ul style="list-style-type: none"> <li>Diphtheria and Tetanus</li> <li>Polio</li> <li>Measles, Mumps and Rubella</li> <li>H Influenza Type B</li> <li>Hepatitis B</li> <li>Chicken Pox</li> <li>Pneumococcal</li> </ul>
	Optimal Asthma Care: <i>the percentage of patients, ages 5-50, who met all 3 individual measures</i>	<ul style="list-style-type: none"> <li>Document well controlled (as per ACT, C-ACT, ACQ and ATAC)</li> <li>Not at risk for exacerbation</li> <li>Has written asthma plan with specific components added</li> </ul>

Alliance	Composite Measure	Individual Measures
Wisconsin	Optimal Diabetes Care: <i>the percentage of diabetes patients, ages 18-75, who met all 3 individual measures</i>	<ul style="list-style-type: none"> <li>• Two HbA1C tests performed during the 12 month reporting period;</li> <li>• One LDL-C cholesterol test performed during the 12 month reporting period;</li> <li>• One kidney function test during the 12 month reporting period, and/or diagnosis and treatment of kidney disease</li> </ul>
	Optimal Hospital care for Pneumonia: <i>measures how well a hospital performed in giving the recommended care proven to give the best results to most adults with pneumonia</i>	<p><u>Process Indicators:</u></p> <ul style="list-style-type: none"> <li>• Oxygenation assessment</li> <li>• Initial abx consistent with current recommendations               <ul style="list-style-type: none"> <li>○ Non-ICU immunocompetent, ICU immunocompetent</li> </ul> </li> <li>• Blood culture within 24 hours (not HQI measure)</li> <li>• Blood culture collected prior to 1st abx</li> <li>• Influenza screening/vaccination</li> <li>• Pneumococcal screening/vaccination</li> <li>• Abx timing w/in 4 hours of hospital arrival</li> <li>• Tobacco cessation counseling</li> </ul>
	Optimal Hospital Care for Heart Failure: <i>measures how well a hospital performed in giving the recommended care proven to give the best results to most adults with heart failure.</i>	<p><u>Process Indicators:</u></p> <ul style="list-style-type: none"> <li>• Left Ventricular Function Assessment</li> <li>• Detailed discharge instructions</li> <li>• ACEI for LVSD</li> <li>• Tobacco cessation counseling</li> </ul>
	Optimal Hospital Care for Acute Myocardial Infarction (AMI): <i>this measure is made up of two components. One component is the process indicator, which is a composite that measures how well a hospital performed in giving the recommended care proven to give the best results to most adults with a heart attack also known as AMI. The second component is an outcome indicator, which is an index of the observed-to-expected survival rate.</i>	<p><u>Process Indicators:</u></p> <ul style="list-style-type: none"> <li>• Angiotensin Converting Enzyme-Inhibitor (ACEI) for Left Ventricular Systolic Dysfunction (LVSD)</li> <li>• Aspirin at discharge</li> <li>• Beta Blocker at discharge</li> <li>• Early Aspirin</li> <li>• Early beta blocker</li> <li>• Tobacco cessation</li> <li>• PTCA within 120 minutes</li> </ul> <p><u>Outcome Indicator:</u></p> <ul style="list-style-type: none"> <li>• Survival Ratio               <ul style="list-style-type: none"> <li>○ Observed survival rate</li> <li>○ Predicted survival rate</li> </ul> </li> </ul>

**What methodologies are Alliances using to construct composite measures?**

There are several ways to construct a composite. For a summary of the common types of composite measure methods and issues to consider see Table 2.

**APPROPRIATENESS MODEL: All-or-nothing**

Each of the Alliances currently use the appropriateness model also referred to as all-or-nothing. The appropriateness model measures the percent of relevant patients who received all of the recommended

care.<sup>5</sup> This method is conceptually appealing because it reflects what should be done but can produce poor performance rates since all individual indicators must be met. If the individual indicators vary in average performance, outlier measures will have the strongest impact on the composite measure rate.<sup>6</sup> Therefore, this methodology works best for closely related measures with the same or similar denominators and levels of performance. Cleveland uses a variation of the appropriateness model for one of its composite measures; requiring at least four of the five indicators to be met.

#### **OPPORTUNITY MODEL: Partial credit**

The opportunity model gives credit to the physician for each episode of appropriate care. The Wisconsin Collaborative for Healthcare Quality uses the congestive heart failure (CHF), pneumonia and acute myocardial infarction (AMI) composite quality measures for their hospital efficiency/value metric. These composites are adapted from the Centers for Medicare and Medicaid Services (CMS) Composite Quality Score. The CHF and pneumonia quality scores are calculated using the opportunities model.

#### **INDEXES: Combining a process composite and outcome(s) measure**

Wisconsin's AMI "composite" illustrates yet another approach in that it is a summary measure or index rather than a composite because it uses the components of two different kinds of measures that may represent different aspects of quality. The components are the process indicator which is calculated using the opportunities model and the outcome indicator that is an index of the observed-to-expected survival rate or survival ratio.

##### ***Process Composite Indicator***

For the AMI measure, a composite rate is calculated for seven process measures using the opportunities model. The seven process measures include:

1. Angiotensin Converting Enzyme-Inhibitor (ACEI) for Left Ventricular Systolic Dysfunction (LVSD)
2. Aspirin at discharge
3. Beta Blocker at discharge
4. Early Aspirin
5. Early beta blocker
6. Tobacco cessation
7. PTCA within 120 minutes

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<sup>5</sup> Aggregate Quality Measures for the National Healthcare Quality Report: Summary of Technical Advisory Panel Meetings May/June 2005. Agency for Healthcare Research and Quality

<sup>6</sup> Asch & Hofer. Representing overall quality of care: the whole must be more than the sum of the parts. White Paper: Advancing Quality Measurement Conference, Oct 2008.

***Outcome Indicator***

The outcome indicator is calculated using one index the survival ratio. The survival ratio is calculated using the following algorithm:

Observed Mortality Rate= 1 - Actual Morality Rate

Predicted Mortality Rate =score derived from JCAHO

Survival Ratio = Observed Mortality Rate/Predicted Mortality Rate

***Combining Process Composite & Outcome***

After the process indicator composite rate and the survival ratio indicator have been calculated, a weighted/aggregate composite methodology is used to produce the final AMI index score. The process composite rate and outcome indicator rate are weighted based on the number of individual measures in the process and outcome scores. For AMI, there are seven individual indicators out of a total of 8 individual indicators for the total measures (process indicators + outcome indicator); therefore the weight for the process composite is 0.875. There is only one indicator for the outcome rate therefore the weight is 0.125. Each weight is then applied to the individual rates to form a weighted ratio for process and a weighted ratio for outcome. These two weighted ratios are added to form the final AMI index score.

Table 2. Methods for Constructing Composite Measures<sup>7</sup>

Method	Example	Text Description	Issues to Consider
<b>Appropriateness Model</b> calculates the percent of relevant individuals who received all of the recommended care. No “partial credit” if individual received some but not all recommended care.	All recommended well-child care processes	“X% of children age 5 who received all X recommended services.”	Rates for this method are typically low as all indicators must be met to receive credit. This model is best used when the denominators are the same and the rates are similar. Outlier rates can strongly impact the composite rate.
<b>Opportunities Model</b> Each patient/provider interaction counts as an opportunity to “do the right thing.” Calculates the percent of the opportunities that were met with appropriate care.	Percent of recommended care received	“Children age 5 received X% of recommended care.”	There are two approaches to this method; patient centered and indicator centered. The patient centered approach measures the percent of opportunities met for which the patient is eligible. The indicator centered approach is the sum of the numerators and denominators. These two approaches can result in different scores. For example if patient A meets 1 of 1 opportunity and patient B meets 3 of 4 opportunities; the score is the average of 100% and 75% under the patient-centered approach (0.88) and the score is 4/5 under the indicator approach (0.80). The opportunities model should be used when using a single database and similar indicator denominators and performance rates. This approach has the disadvantage of weighting all opportunities the same, even though some opportunities may be more significant than others.
<b>Aggregate or Weighted</b> Each provider has a performance rate for each measure. The average of the rates is calculated or the rates can have differential weighting.	Average performance on well child measures	“Physician group A had an average X performance on recommended well care measures for children age 5.”	With this method individual indicator rates can be standardized to put them on the same scale or there may be weighting of indicators according to importance. If rates are standardized; results are not interpretable and often translated to symbols such as stars. This method is best used with a single database.
<b>Counts</b> Number of measures that improved or deteriorated.	Number of well child measures increasing in rate	“Physician group A demonstrated increases in 4 of 5 well child process measures.”	Although this is not the most robust method for composites; this method may be preferred to quantify changes over time. It can be used when there is more than one database and when there are different types of measures.

<sup>7</sup> Aggregate Quality Measures for the National Healthcare Quality Report: Summary of Technical Advisory Panel Meetings May/June 2005. Agency for Healthcare Research and Quality

## Composite Measure Considerations

Before deciding what methods to use, the Alliance should consider the purpose for using composite measures. Some of the common reasons to use composite measures include improving consumer comprehension, communicating with policy makers, encouraging systematic improvements, or improving the reliability of measures.<sup>8, 9, 10, 11</sup>

Composite measures also allow for measuring different dimensions of health care quality. To date, all communities have chosen to use clinical domains for measurement (e.g. diabetes), but composite measures can also be used to measure different components of care such as prevention or disease management or even type of provider (i.e. surgeons). The Alliance must also determine what organizational level to include (i.e. hospitals, provider groups or individual providers).

In July of 2009, the NQF endorsed three composite measures and identified a framework for evaluating composite measures. This framework builds upon the existing NQF measure endorsement criteria (important to measure and report, scientific acceptability of measure components, usability and feasibility).<sup>12</sup> The three NQF endorsed composite measures include Mortality for Selected Conditions, Pediatric Safety for Selected Indicators and Patient Safety for Selected indicators.

As the NQF moves towards the endorsement of more composite measures, Alliances must consider whether they will experiment with unendorsed measures or if they should wait for standardized approaches. By moving forward with unendorsed composites, an Alliance can test the feasibility of collecting and reporting these measures. The use of composite measures may also assist in current efforts by the Alliances to engage consumers and effect health system improvements. Alternatively, by using non-standardized approaches, Alliances may lack the scientific and political capital that comes from using endorsed measures. Furthermore, experimenting with non-endorsed measures may mean that Alliance will have to re-work their measures to meet standardized approaches once endorsed. The resources required to measures, collect and then possibly re-work composites should be considered when deciding whether to move forward or wait for endorsed measures.

## Pros and Cons of Using Composite Measures<sup>13</sup>

As mentioned earlier, there are numerous benefits to using composite measures. In addition to increasing the reliability of measures; one of the greatest benefits of composite measures is the ability to summarize complex issues. Composite measures facilitate communication and comprehension of performance measures to the general public, and can support decision making and systems improvement. When trending performance results, composite measures are easier to interpret rather than trying to find a trend in many separate indicators. Composite measures can also place issues of the performance at the center of policy discussions.

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<sup>8</sup> Peters E, Dieckmann N, Dixon A, Hibbard J, Mertz C. Less is More in presenting Quality Information to Consumers. *Medical Care Research and Review*. 2007. Apr;64(2): 169-190.

<sup>9</sup> Tu HT, Lauer JR. Designing Effective Health Care Quality Transparency Initiatives. Center for Studying Health System Change. Issue Brief No. 126. July 2009.

<sup>10</sup> Scholle SH, Roski J, Adams JL, Dunn DL, Kerr EA, Dugan DP, Jensen RE. [Benchmarking physician performance: reliability of individual and composite measures](#). *Am J Manag Care*. 2008 Dec;14(12):833-8.

<sup>11</sup> Kaplan SH, Griffith JL, Price LL, Pawlson LG, Greenfield S. Improving the Reliability of Physician Performance Assessment: Identifying the “Physician Effect” on Quality and Creating Composite Measures. *Med Care*. 2009. Apr;47(4):378-87.

<sup>12</sup> National Quality Forum (NQF). Composite Measure Evaluation Framework and National Voluntary Consensus Standards For Mortality and Safety-Composite Measures. A Consensus Report. Washington, DC: NQF; 2009.

<sup>13</sup> Nardo M. et al. Handbook on Constructing Composite Indicators: Methodology and User Guide, Statistics Working Paper 2005/3. Organization for Economic Co-operation and Development: Statistics Directorate. Paris, France.

While there are numerous benefits to composite measures, Alliances should also consider the potential negative impacts; many of which are similar to issues faced with other reporting activities. Composite measures may be misused or may mask serious failures on some indicators. Furthermore, increased issues of attribution may arise and poorly constructed composite measures can lead to inaccurate performance scores. Composite measures may invite simplistic policy conclusions or inappropriate policies if the dimensions of the individual indicators are ignored. Additionally, the selection of indicators and weights may become a target to political challenge.

As outlined above, there are many reasons for using composite measures and a number of thought provoking considerations in selecting an appropriate methodology. Whichever method is chosen, it is most important that it is developed in a thoughtful way that will produce meaningful results.