CHIPRA Pediatric Quality Measures Program (PQMP) Candidate Measure Submission Form (CPCF)

The **C**HIPRA **P**ediatric Quality Measures Program (PQMP) **C**andidate Measure Submission **F**orm (CPCF) was approved by the Office of Management and Budget (OMB) in accordance with the Paperwork Reduction Act. The OMB Control Number is 0935-0205 and the Expiration Date is December 31, 2015.

Contents

INTRODUCTION

In 2009, the Children's Health Insurance Program Reauthorization Act (CHIPRA) reauthorized the Children's Health Insurance Program (CHIP) originally established in 1997.[1] Title IV of the law included a number of provisions aimed at improving health care quality and outcomes for children. Section 401(a) of CHIPRA called for the identification of an initial core set of health quality measures for children enrolled in Medicaid or CHIP based on measures available in 2009. The initial core set[2] was recommended by the Agency for Healthcare Research and Quality (AHRQ) National Advisory Subcommittee on Children's Health Quality Measures for Medicaid and CHIP (SNAC), posted for public comment by the Secretary of the U.S. Department of Health and Human Services (HHS) on December 29, 2009, and made available for voluntary use by State Medicaid and CHIP programs in February 2011, along with technical specifications.[3]

Section 401 (b) of CHIPRA created the Pediatric Quality Measures Program (PQMP) to improve the initial core set of pediatric quality measures and increase the portfolio of evidence-based measures available to public and private purchasers of children's health care services, providers, and consumers. Improved core measures are to be posted annually beginning January 1, 2013. The PQMP is a partnership between AHRQ and the Centers for Medicare & Medicaid Services (CMS). As part of the PQMP, there are seven Centers of Excellence (COEs)—a consortium of academic institutions, State partners, consumers, and others—that will develop and test measures over the course of the program for categories specified by CHIPRA and topics identified by CMS and AHRQ.[4] In addition to the measures submitted by the COEs, public nominations for quality measures will be solicited in the spring of each year. All submitted measures will be reviewed by a SNAC[5] of the AHRQ National Advisory Council on Research and Quality (NAC). The SNAC will make recommendations to the NAC, which advises the director of AHRQ, who in turn will make recommendations to CMS and the Secretary of HHS.

CHIPRA notes that measures in the improved core sets should be evidence based; cover a full range of services, conditions, and ages; be able to identify disparities by race,

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1 Children's Health Insurance Program Reauthorization Act of 2009. Public Law No. 111-3, 123 Stat. 8 (2009). Available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_public_laws&docid=f:publ003.111.

2 CHIPRA Initial Core Set of Children's Health Care Quality Measures. Available at: http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/CHIPRA-Initial-Core-Set-of-Childrens-Health-Care-Quality-Measures.html.

3 CHIPRA Initial Core Set of Children's Health Care Quality Measures: Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting**.** Available at: http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/Downloads/InitialCoreSetResourceManual.pdf.

4 Pediatric Quality Measures Program Centers of Excellence Grant Awards. AHRQ Publication No. 12-P006, March 2012. AHRQ, Rockville, MD. http://www.ahrq.gov/policymakers/chipra/pubs/pqmpfact.html.

5 AHRQ National Advisory Council on Research and Quality. Subcommittee on Quality Measures for Children's Health Care. Members List. 2012. Available at: http://www.ahrq.gov/policymakers/chipra/coreset/qmsnaclist12.html.

ethnicity, socioeconomic status, and special health care need; be risk adjusted as appropriate; and designed to ensure that data are collected and reported in a standard format that permits comparison of quality and data at a State, plan, and provider level.

This template, the **C**HIPRA **P**ediatric Quality Measures Program (PQMP) **C**andidate Measure Submission **F**orm (CPCF) was developed by the COEs, the SNAC, the CHIPRA Coordinating and Technical Assistance Center (CCTAC) at RTI International, and AHRQ as a standardized form to be used for all nominations for pediatric quality measures under the CHIPRA legislation. The first part of the CPCF template provides guidance on the submission process. The template then includes opportunities for all measure submitters to provide a basic description of their measure, and address a number of desirable measure attributes for pediatric quality measures. The desirable measure attributes include importance, evidence or other rationale for focus of the measure, scientific soundness of the measure itself, identification of disparities, feasibility, levels of aggregation, understandability, and health information technology. The form also requests identification of the limitations of the measure being submitted. It then provides an opportunity to summarize why the measure should be recommended by the SNAC, taking into account the measure's advantages and limitations in relation to the desirable measure attributes. The template requires measure submitter information, public disclosure requirement requiring signed written statement, and an opportunity to upload supplementary material including graphics, figures, tables, and any other information to facilitate review of the measure by the SNAC. Attachments may be in PDF format only. The final section of the template provides a glossary of terms. Many of the desirable attributes are similar to those called by other leading entities that solicit measures, but several are CHIPRA specific (e.g., more child focused, spotlight on disparities, and attention to specific levels of aggregation). The SNAC will interpret the extent to which the measure is suitable for voluntary use by Medicaid, CHIP, or other public and private programs, purchasers, plans, providers and consumers using the information provided in the template.

NOTE: If a section is not applicable to the measure, please write 'Not applicable' in the text field before progressing to the next section. If the information is not available, please write "Not available" in the text field before progressing to the next section.

<< >> indicates the name of a text field in the online version of CPCF.

+ indicates a field to upload attachment in the online version of CPCF.

Section I.
Basic Measure Information

I.A. Measure Name

Appropriateness of Emergency Department Visits for Children and Adolescents with Identifiable Asthma

I.B. Measure Number (auto-generated)

I.C. Measure Description

This measure estimates the proportion of emergency department visits for asthma that meet criteria for the ED being the appropriate level of care among all ED visits for asthma in children and adolescents with identifiable asthma.

I.D. Measure Owner

CAPQuaM

I.E. National Quality Forum (NQF) ID (if applicable)

N/A

I.F. Measure Hierarchy

Please note here if the measure is part of a measure hierarchy or is part of a measure group or composite measure. The following definitions are used by(AHRQ)'s National Quality Measures Clearinghouse and are available at http://www.qualitymeasures.ahrq.gov/about/hierarchy.aspx:

I.F.1. Please identify the name of the collection of measures to which the measure belongs (if applicable). A Collection is the highest possible level of the measure hierarchy. A Collection may contain one or more Sets, Subsets, Composites, and/or Individual Measures.

This measure belongs to the PQMP Measures of Emergency Department Use for Children with Asthma - Process Collection

I.F.2 Please identify the name of the measure set to which the measure belongs (if applicable). A Set is the second level of the hierarchy. A Set may include one or more Subsets, Composites, and/or Individual Measures.

This measure belongs to the PQMP Measures of Emergency Department Use for Children with Asthma - Appropriateness Set.

I.F.3 Please identify the name of the subset to which the measure belongs (if applicable). A Subset is the third level of the hierarchy. A Subset may include one or more Composites, and/or Individual Measures.

N/A

I.F.4 Please identify the name of the composite measure to which the measure belongs (if applicable). A Composite is a measure with a score that is an aggregate of scores from other measures. A Composite may include one or more other Composites and/or Individual Measures. Composites may comprise component Measures that can or cannot be used on their own.

N/A

I.G. Numerator Statement

The numerator is defined as the number of denominator events that that also satisfy at least one of the explicit appropriate use criteria and are in the random sample specified in Section II, Technical Specifications. Separate numerators and denominators are reported for children age 2-5, 6-11, 12-18, and, optionally, 19-21 years.

Numerator Elements:

Presence or absence of documented evidence any of the following:

- The child or adolescent was transferred or admitted to an inpatient hospital directly from the ED (may be administrative or chart review evidence).
- The child or adolescent was referred to the ED by their primary care clinician or other clinician after being evaluated
- Prior to arrival in the ED, the child received two or more doses of inhaled rescue medications for the episode without clinical improvement (documentation of parent/caregiver report sufficient)
- Prior to arrival to the ED the child was found to be in a pre-defined and individualized “red zone” of peak flow measurement (documentation of parent/caregiver report sufficient)
- Physical exam evidence of respiratory distress or labored breathing in the ED, such as:
    - retractions,
    - accessory muscle use, OR
    - markedly decreased breath sounds
- An oxygen (O_2) saturation < 90%
- An arterial blood gas (ABG) test was obtained
- A consult with a pulmonologist or other asthma specialist was obtained in the ED

I.H. Numerator Exclusions

Numerator Events occurring in patients who do not meet denominator criteria OR are not in the random sample for inclusion

I.I. Denominator Statement

The denominator represents a random sample of the patients in each age stratum who have visited the emergency department for asthma (as a first or second diagnosis) and meet the specified criteria for having identifiable asthma.

Separate numerators and denominators are reported for children age 2-5, 6-11, 12-18, and, optionally, 19-21 years.

Denominator Elements:

The presence of identifiable asthma is established each month from administrative data using the specified algorithm and evidence includes:

- Any prior hospitalization with asthma as primary or secondary diagnosis; **OR**,
- Other qualifying events, all ages:
    - Three or more ambulatory visits with diagnosis of asthma or bronchitis, **OR**
    - Two or more ambulatory visits with a diagnosis of asthma and/or bronchitis **AND** one or more asthma-related prescriptions
- **OR** For children older than five who have an ED visit for asthma (as first or second diagnosis) in the reporting month and prior to the reporting month who have had:
    - One or more prior ambulatory visits with asthma as the primary diagnosis after the fifth birthday, **OR**
    - Two or more ambulatory visits after the fifth birthday with asthma as a diagnosis, **OR**
    - One ambulatory visit with asthma as a diagnosis **AND** at least one asthma-related prescription, both occurring after the fifth birthday **OR**
    - Two or more ambulatory visits with a diagnosis of bronchitis after the fifth birthday

For eligibility purposes, **asthma-related medicine** means long-acting beta-agonist (alone or in combination) or inhaled corticosteroid (alone or in combination), anti-asthmatic combinations, methylxanthines (alone or in combination), and/or mast cell stabilizers.

All events in the administrative data should be associated with a date of service.

Table 1. Children meeting the criteria for having identifiable asthma can by identified by the following:

Criteria for assessing "identifiable asthma" (Evidence must include all readily available data regarding whether or not a child used a service. CPT and revenue codes are indicated as appropriate.)	**Codes**
Hospitalization	**CPT Codes:** CPT 99238 CPT 99232 CPT 99239 CPT 99233 CPT 99221 CPT 99234 CPT 99222 CPT 99235 CPT 99223 CPT 99236 CPT 99356 CPT 99218 CPT 99357 CPT 99219 CPT 99231 CPT 99220 **Or Revenue Codes:** 0110 0133 0111 0134 0112 0137 0113 0139 0114 0150 0117 0151 0119 0152 0120 0153 0121 0154 0122 0157 0123 0159 0124 0200 0127 0201 0129 0202 0130 0203 0131 0204 0132 0206
Office visits	CPT 99201 CPT 99211 CPT 99202 CPT 99212 CPT 99203 CPT 99213 CPT 99204 CPT 99214 CPT 99205 CPT 99215

Criteria for assessing "identifiable asthma" (Evidence must include all readily available data regarding whether or not a child used a service. CPT and revenue codes are indicated as appropriate.)	**Codes**
Previous ED Visits	**CPT Codes:** CPT 99281 CPT 99284 CPT 99282 CPT 99285 CPT 99283 **Revenue Codes:** 0450 Emergency Room 0451 Emergency Room: EM/EMTALA 0452 Emergency Room: ER/Beyond EMTALA 0456 Emergency Room: Urgent Care 0459 Emergency Room: Other Emergency Room 450 Emergency Room 451 Emergency Room: EM/EMTALA 452 Emergency Room: ER/Beyond EMTALA 456 Emergency Room: Urgent Care 459 Emergency Room: Other Emergency Room 0981 Professional Fees (096x) Emergency Room 981 Professional Fees emergency room
Diagnoses of asthma	**ICD-9 Codes:** All codes beginning with 493 ICD-10 Codes: All codes beginning with J45
Filled prescriptions for **Asthma related medications**	*Use NCQA NDC list (ASM-C_DASM-C_final_2012, found by clicking through at (http://www.ncqa.org/HEDISQualityMeasurement/HEDISMeasures/HEDIS2012/HEDIS2012FinalNDCLists.aspx) Eliminate medications in the following 2 categories: leukotriene modifiers, short-acting inhaled beta-2 agonists). May use equivalent updated lists when provided by NCQA.*

I.J. Denominator Exclusions

1) Children with concurrent or pre-existing:
    a. Chronic Obstructive Pulmonary Disease (COPD) diagnosis (ICD-9 code: 496) (ICD-10-CM code: J44);
    b. Cystic Fibrosis diagnosis (ICD-9 code 277.0, 277.01. 277.02, 277.03, 277.09) (ICD-10-CM code: E84);
    c. Emphysema diagnosis (ICD-9 code 492xx) (ICD-10-CM code: J43)
2) Children without a prior established medical history of an asthma diagnosis of at time of ED visit
3) Any child that does not meet the age requirement
4) Failure to have three months of continuous enrollment including the reporting month

I.K. Data Sources

Check all the data sources for which the measure is specified and tested.

Data Source	[Online form will have radio buttons here]
1. Administrative Data (e.g., claims data)	YES
2. Paper Medical Record	YES
3. Survey – Health care professional report	NO
4. Survey – Parent/caregiver report	NO
5. Survey – Child report	NO
6. Electronic Medical Record	YES
7. Other (If other, please list all other data sources in the field below.)	

SECTION II.
DETAILED MEASURE SPECIFICATIONS

Provide sufficient detail to describe how a measure would be calculated from the recommended data sources, either by uploading a separate document or by providing a link to a URL in the field below. Examples of detailed measure specifications can be found in the CHIPRA Initial Core Set Technical Specifications Manual 2011 published by the Centers for Medicare & Medicaid Services.[6] Although submission of formal programming code or algorithms that demonstrate how a measure would be calculated from a query of an appropriate electronic data source are not requested at this time, the availability of these resources may be a factor in determining whether a measure can be recommended for use.

A. Description

The measure distinguishes between those child and adolescent Emergency Department (ED) visits for asthma that do and do not have documented evidence indicating that the ED is an appropriate level of care for the visit, according to explicit criteria. The criteria were developed by an expert panel using a modified RAND/UCLA approach as part of work performed in the Pediatric Quality Measures Program by the Mount Sinai Collaboration for Advancing Pediatric Quality Measures (CAPQuaM).

We specify visits as appropriate or of questionable appropriateness ("questionable") after review of both administrative and chart audit data, using a variation of the HEDIS approach for hybrid measures.

B. Eligible Population

Children and adolescents ages 2 – 21 with asthma who:

- Have received sufficient medical services for asthma to meet the specified criteria for identifiable asthma prior to the month assessed;
- Have three consecutive months of enrollment in the responsible entity, including the month being assessed; AND,
- Have an ED visit associated with asthma as the first or second diagnosis

This measure is specified for children and adolescents up to age 21. The oldest age cohort of 19-21 is optional and its inclusion or exclusion should be context specific, including the needs of the reporting entity and the entity to whom the reports are being submitted.

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6 Initial Core Set of Children's Health Care Quality Measures: Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting. Available at http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/Downloads/InitialCoreSetResourceManual.pdf and http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/CHIPRA-Initial-Core-Set-of-Childrens-Health-Care-Quality-Measures.html.

Descriptive definitions for being managed for identifiable asthma are as follows. Specifications follow the descriptive definitions. Identifiable asthma is present in any child who has:

- Any prior hospitalization with asthma as primary or secondary diagnosis; or,
- Other qualifying events, all ages:
    - Three or more ambulatory visits with diagnosis of asthma or bronchitis, **OR**
    - Two or more ambulatory visits with a diagnosis of asthma and/or bronchitis **AND** one or more asthma-related prescriptions
- **OR** For children older than five who have an ED visit for asthma (as first or second diagnosis) in the reporting month and prior to the reporting month who have had:
    - One or more prior ambulatory visits with asthma as the primary diagnosis after the fifth birthday, **OR**
    - Two or more ambulatory visits after the fifth birthday with asthma as a diagnosis, **OR**
    - One ambulatory visit with asthma as a diagnosis **AND** at least one asthma-related prescription, both occurring after the fifth birthday **OR**
    - Two or more ambulatory visits with a diagnosis of bronchitis after the fifth birthday

For eligibility purposes, **asthma-related medicine** means long-acting beta-agonist (alone or in combination) or inhaled corticosteroid (alone or in combination), anti-asthmatic combinations, methylxanthines (alone or in combination), and/or mast cell stabilizers.

Please see Table 1.

Table 1. Children meeting the criteria for having identifiable asthma can be identified using the following:

Criteria for assessing "identifiable asthma" (Evidence must include all readily available data regarding whether or not a child used a service. CPT and revenue codes are indicated as appropriate.)	**Codes**
Hospitalization	**CPT Codes:** CPT 99238 CPT 99232 CPT 99239 CPT 99233 CPT 99221 CPT 99234 CPT 99222 CPT 99235 CPT 99223 CPT 99236 CPT 99356 CPT 99218 CPT 99357 CPT 99219 CPT 99231 CPT 99220 **Or Revenue Codes:** 0110 0133 0111 0134 0112 0137 0113 0139 0114 0150 0117 0151 0119 0152 0120 0153 0121 0154 0122 0157 0123 0159 0124 0200 0127 0201 0129 0202 0130 0203 0131 0204 0132 0206
Office visits	CPT 99201 CPT 99211 CPT 99202 CPT 99212 CPT 99203 CPT 99213 CPT 99204 CPT 99214 CPT 99205 CPT 99215

Criteria for assessing "identifiable asthma" (Evidence must include all readily available data regarding whether or not a child used a service. CPT and revenue codes are indicated as appropriate.)	**Codes**
Previous ED Visits	**CPT Codes:** CPT 99281 CPT 99284 CPT 99282 CPT 99285 CPT 99283 **Revenue Codes:** 0450 Emergency Room 0451 Emergency Room: EM/EMTALA 0452 Emergency Room: ER/Beyond EMTALA 0456 Emergency Room: Urgent Care 0459 Emergency Room: Other Emergency Room 450 Emergency Room 451 Emergency Room: EM/EMTALA 452 Emergency Room: ER/Beyond EMTALA 456 Emergency Room: Urgent Care 459 Emergency Room: Other Emergency Room 0981 Professional Fees (096x) Emergency Room 981 Professional Fees emergency room
Diagnoses of asthma	**ICD-9 Codes:** All codes beginning with 493 ICD-10 Codes: All codes beginning with J45
Filled prescriptions for **Asthma related medications**	*Use NCQA NDC list (ASM-C_DASM-C_final_2012, found by clicking through at (http://www.ncqa.org/HEDISQualityMeasurement/HEDISMeasures/HEDIS2012/HEDIS2012FinalNDCLists.aspx) Eliminate medications in the following 2 categories: leukotriene modifiers, short-acting inhaled beta-2 agonists). May use equivalent updated lists when provided by NCQA.*

C. Specific Exclusions

Children with concurrent or pre-existing:

- Chronic Obstructive Pulmonary Disease (COPD) diagnosis (ICD-9 code: 496; ICD-10-CM code: J44); OR,
- Cystic Fibrosis diagnosis (ICD-9 code: 277.0, 277.01, 277.02, 277.03, 277.09; ICD-10-CM code: E84); OR,
- Emphysema diagnosis (ICD-9 code: 492xx; ICD-10-CM code: J43)

Events occurring in patients who have not been enrolled in the reporting plan for at least two consecutive months before the index reporting month (a total of 3 consecutive months).

D. Data and Sources

This is a hybrid administrative data and chart review measure. Administrative review establishes eligibility for randomization into the sample. Not all events identified for the sample or subject to chart review will qualify for inclusion in the measure.

Administrative Data (billing, diagnosis, procedure codes, pharmacy data) with Medical Record (electronic or paper)

General data elements include:

- Personal Demographics: Age, Sex or Gender, Race and Ethnicity
- Zip code or State and County of residence (Record FIPS where available)
- Insurance type: Medicaid/CHIP (or other government issued such as military), Private, Workers Compensation, Uninsured (includes self-pay)

General data elements should be identified using administrative data when they are known to be reliable; otherwise they should be obtained from the medical record (chart audit) after inclusion in the random sample.

Administrative data elements include:

- CPT and revenue codes (Table 1) to establish identifiable asthma and to identify qualifying emergency department visits and hospitalizations
- Pharmacy fill data when available to incorporate into the identifiable asthma algorithms
- Date of service for indicated events

Medical record data elements include:

Assessing the relationship between ED visits and hospitalizations:

- Establishing whether the disposition of the ED visit was admission to the hospital;
- Establishing whether the hospitalization identified through administrative data can be attributed to admission from a unique ED visit not already in the sample.

Findings from the ED visit only:

- Documented physical findings consistent with respiratory distress, including:
  - Labored breathing (including moderate or severe increased work of breathing);
  - Retractions, grunting, and/or evidence of accessory muscle use;
  - Markedly decreased breath sounds;
- Low oxygen (O_2) saturation level (dichotomized, < 90% qualifies);
- An arterial blood gas (ABG) was obtained;
- The child had a consultation with a pulmonologist or asthma specialist;
- There is documentation that prior to arrival in the ED:
  - The child was referred to the ED after evaluation by the PCP or other clinician;
  - The child received two or more doses of inhaled rescue medications without sufficient clinical improvement;
  - The child was assessed with an objective instrument such as a peak flow meter and was found to be in a pre-defined "red zone" of peak flow measurement as part of an asthma action or similar plan.

E. CALCULATION

Step 1: Select starting cohort

Identify the upper age limit to be used, either 18 or 21. The measure is specified from 2 to 21 years, with 19-21 year olds considered optional.

Figure 1 below, at the end of this Section 2 provides an overview of sample selection and measure calculation.

Step 2: Conduct analysis of administrative data using the specifications described in B. Eligible Population (above) to identify children within the specified age range with identifiable asthma using criteria above (and using indicated exclusions).

The analysis should be conducted on a month by month basis as described herein:

Within the group of children who meet the criteria for identifiable asthma, identify and maintain a unique patient identifier, age, and all stratification variables described below.

Determine eligibility for each patient, as of the last day of the month prior to the

reporting month.

For example, if the goal is to report for January 2011, first identify children with identifiable asthma (above), and analyze all of calendar year 2010 when doing so. Continuous enrollment criterion requires that the child was enrolled in November and December of 2010.

Next, for February analyze all of calendar year 2010 AND January 2011. Continuous enrollment criterion requires that the child was enrolled in December 2010 and January 2011.

Repeat this progression monthly so that for December, one would identify children with identifiable asthma and analyze all of calendar year 2010 AND January through November 2011 when doing so. Continuous enrollment criterion requires that for December the child was enrolled in October 2011 and November 2011.

See Figure 2 on following page.

Figure 2

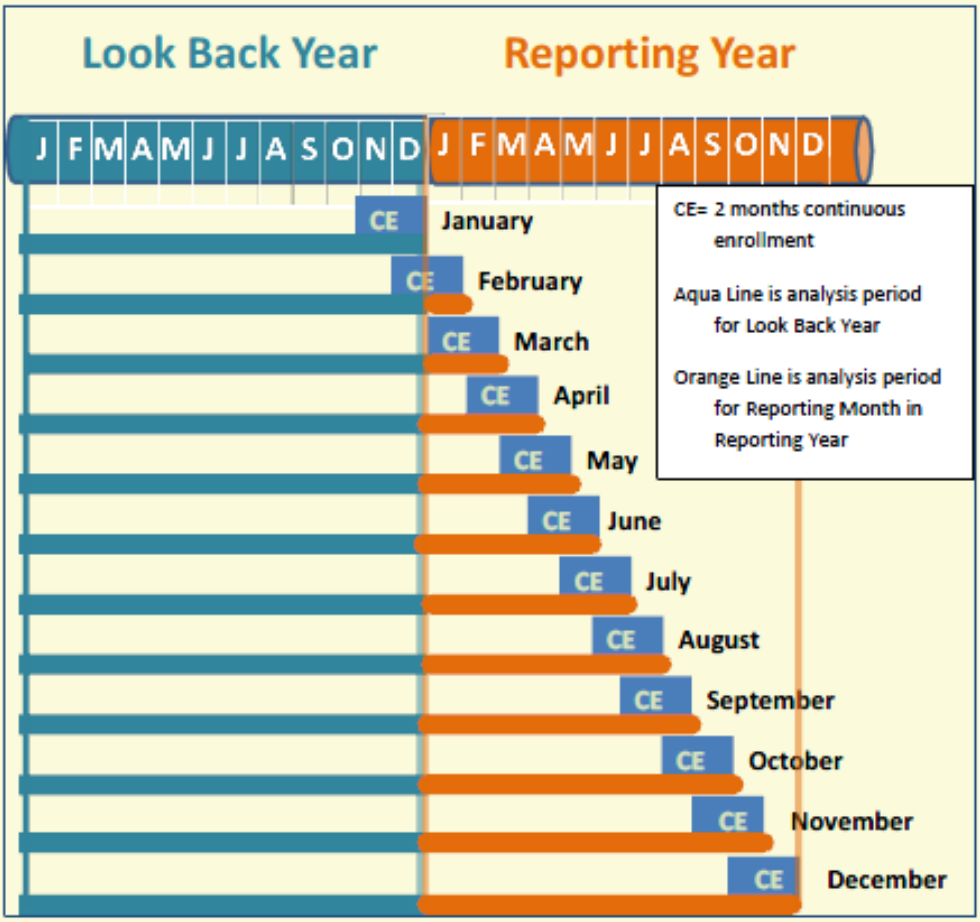

Diagram of Eligibility Requirements for Asthma Measure

<u>Description of Diagram Components</u>
Aqua: Look Back Year
Orange: Reporting Year
Blue: Continuous Enrollment (CE) period must be met to be eligible in a given reporting month
Black: Label of Reporting Month

<u>Description of Eligibility Criteria Assessment</u>
Eligibility Criteria are assessed month by month, using both the entire Look Back Year and the Reporting Year.

For any given reporting month, assess eligibility on 2 criteria. Eligible children are those that meet both of the following:

1) Has the child been continuously enrolled (CE) for the two months prior to the Reporting Month (3 months of continuous enrollment including the current Reporting Month)
2) Does the child meet the criteria for having been managed for identifiable asthma in the assessment period (Aqua + Orange Lines)

Step 3: Identify ED Visits and hospitalizations for asthma in eligible children

Considering only the children who were identified as eligible in the given month according to Step 2, perform a month-by-month analysis to identify and log all ED visits with asthma as a primary or secondary diagnosis and all hospitalizations with asthma as a primary or secondary diagnosis for each reporting month. Maintain stratification variables, age, and unique identifiers.

Step 4: Stratify by age and develop random samples.

Stratify by age group (use age at month of qualifying event):

- Age 2-5 years (second birthday to the day before the 6th birthday);
- Age 6-11 years (sixth birthday to the day before the 12th birthday);
- Age 12-18 years (twelfth birthday to the day before the 18th birthday); and
- Age 19-21 years (nineteenth birthday to the day before the 21st birthday).

Within each age group, randomly select 500 records.

Analyze each age group's random sample distinctly:

Sort into three groups.

- Group A: Those with asthma ED visits ONLY and no associated asthma hospitalization to the same hospital on the same date. These ED visits are INCLUDED in the *Denominator* and Receive Medical Record Review to assess eligibility for the *Numerator*;
- Group B: Those with both Asthma ED Visits and Asthma Hospitalizations at the same facility on the same date and for whom the hospital discharge date is after the ED date of service. These ED visits are INCLUDED in the *Denominator* and in the *Numerator*. No further review is necessary to establish appropriateness;
- Group C: Those with asthma Hospitalizations ONLY and no associated asthma ED Visit to the same hospital on the same date. Please note that children admitted to the ED one date and admitted to the hospital the next day (from the same ED visit) will be identified in this group. Group C Hospitalizations are subject to Medical Record Review to assess eligibility for the *Denominator.* If they are eligible for the denominator they will be included in BOTH the *Numerator* and *Denominator*.

Please note that the terms medical chart and medical record are used interchangeably, as are the terms audit and review in this context.

Step 5: Collect data elements from administrative data

Collect the following data elements for all eligible children in each randomized sample. These data elements are used for reporting stratified results. Entities that are interested in assuring large samples for specific stratified analyses may choose to incorporate a further stratified sampling scheme and oversample to assure that there is a sample size of 100-500 per stratification category (e.g. race or ethnicity of interest). Such a sampling scheme must employ an appropriate weighting system (using the reciprocal of the likelihood for selection as a weight, c.f. Rao, P., 2000. *Sampling Methodologies with Applications*. New York: Chapman & Hall) to estimate overall performance. Alternatively, the stratified samples may be used only for reporting

stratum specific performance comparison and not for estimating the overall performance. Approximate 95% confidence interval widths (assuming a rate of 50% appropriateness) are shown here. We oversample by 25% to account for potential loss in our event identifications.

Relationship Between Sample Size and Width of 95 % Confidence Interval	
N=	50, + / - 13%
N=	75, + / - 11%
N=	100, + / - 10%
N=	150, + / - 8%
N=	200, + / - 7%
N=	250, + / - 6%
N=	400, + / - 5%

Stratification Variables should include:

- Race
- Ethnicity
- Insurance type (Public, Commercial, Uninsured)
- Benefit type (if insured): HMO, PPO, Medicaid Primary Care Case Management (PCCM) Plan, Fee for Service (FFS), other
- Zip code, state and county or equivalent area of parent/caregiver's residence. Record FIPS if available

Step 6: **Create stratification variables**

- Race/Ethnicity: Hispanic, Non-Hispanic Black, Non-Hispanic White; Non-Hispanic Asian/Pacific Islander, other Non-Hispanic
- Public vs Commercial (Private Insurance).
- HMO vs PPO vs FFS vs PCCM vs other; Within Medicaid, States may ask for reporting of FFS vs Managed Care or other relevant enrollment categories.
- Urban Influence Code. Identify the Urban Influence Code or UIC. (2013 urban influence codes available at: http://www.ers.usda.gov/data-products/urban-influence-codes.aspx#.UZUvG2cVoj8). Use parent or primary caregiver's place of residence to determine UIC. State and county names can be linked or looked up directly or zip codes can be linked to county indirectly, using the Missouri Census Data Center (http://mcdc.missouri.edu/). These data will link to county or county equivalents as used in various states.

- Identify the Level of Poverty in the parent or primary caregiver's county of residence. The percent of all residents in poverty by county or county equivalent are available from the US Department of Agriculture at http://www.ers.usda.gov/data-products/county-level-data-sets/download-data.aspx. Our stratification standards are based on 2011 US population data that we have analyzed with SAS 9.3. Using parent or primary caregiver's state and county of residence (or equivalent) or FIPS code, use the variable PCTPOVALL_2011 to categorize into one of 5 Strata:
    - Lowest Quartile of Poverty if percent in poverty is <=12.5%
    - Second Quartile of Poverty if percent in poverty is >12.5% and <=16.5%
    - Third Quartile of poverty if percent in poverty is >16.5% and <=20.7%
    - First Upper Quartile (75th-90th) if percent in poverty is >20.7% and <=25.7%
    - Second Upper Quartile (>90th percentile)

Note: if needed, the Missouri Census Data Center may be used to link zip codes to county equivalents. http://mcdc.missouri.edu/

Step 7. Conduct Chart Audit (Medical Record Review) of Group A ED Visits. Group A ED visits that have been selected for inclusion in the sample require a chart audit to assess eligibility for the numerator based on the explicit appropriateness criteria. They have already qualified for inclusion in the denominator.

Eligibility for the numerator is established based on documentation of any of the following items. Review may be terminated once *any* qualification for the numerator is identified.

- Disposition of the child from the ED was to an inpatient hospital.
- Documented physical findings consistent with respiratory distress, including:
    - Labored breathing with retractions and/or grunting;
    - Labored breathing with evidence of accessory muscle use; or,
    - Markedly decreased breath sounds;
- Low O_2 saturation level, defined as < 90%;
- An ABG obtained and reported;
- A consultation obtained in the ED with a pulmonologist or other physician asthma specialist;
- Specific documentation that:
    - The child was referred to the ED after evaluation by the PCP or other licensed clinician practitioner; OR
    - The child received two or more doses of inhaled rescue medications without sufficient clinical improvement; OR
    - The child was assessed with an objective instrument such as a peak flow meter and was found to be in a pre-defined "red zone" of peak flow measurement as part of a pre-specified asthma action or similar plan.

There is no specified order for review. Some institutions may prefer to record all reasons for numerator qualification to support ongoing or planned improvement activities.

Note 1: Evidence for hospitalization above requires that the child was admitted to any hospital as an inpatient. This includes admission directly to a medical or pediatric ICU or inpatient floor or transfer directly to an inpatient facility. If a child is transferred to another hospital, confirmation that the child actually was admitted directly (i.e., was not first admitted to another ED prior to admission) is necessary prior to qualifying for the numerator. Such confirmation may include evidence from the administrative data review in Step 2. Other potential sources for this information include ED discharge summary, disposition on a flow, admit, or discharge form, or documentation by doctors, nurses, nurse practitioners or physician assistants.

Note 2: Evidence that the child was referred to the ED requires documentation of both of two requirements. The requirements are:

- The child/adolescent was referred by a clinician to come to the ED; and
- The child/adolescent was evaluated by the clinician prior to referral. Generally such evaluations will be in person. Assessment of respiratory distress by listening or speaking to the child/adolescent over the telephone is sufficient if such an examination is clearly documented.

Report of each requirement being met by the child/adolescent or parent/caregiver is sufficient to meet this criterion. Report of contact from the referring physician can also fulfill this criterion. Nursing notes, triage notes and clinician notes, particularly history of present illness (HPI) are common sources for this data.

Note 3: Evidence of a parent or caregiver report that the child received two or more doses of an inhaled rescue medication with insufficient clinical improvement typically will be found in triage, nursing, clinician, or respiratory therapy notes. It may also be documented as a part of medication reconciliation during intake. It requires documentation:

- That multiple treatments of medication were provided by inhalation or injection prior to arrival in the ED;
- That the medication(s) provided were specifically rescue medications and are not a part of the of the child/adolescent's preventive or maintenance regimen; and,
- That the child continued to be in distress following the treatments (alternately that the child did not improve substantially).

Note 4: Parent / caregiver report that their child was in a pre-defined "red zone" of peak flow measurement includes documentation:

- That a pre-specified asthma plan (action plan) exists and defines a "red zone" based upon an objective respiratory measurement, such as a peak flow rate; and
- That the objective assessment was made prior to coming to the ED and that the results were in the pre-specified "red zone."

Note 5: Reports of the physical exam typically may be found on triage, nursing, physician, nurse practitioner, physician assistant, or respiratory therapist notes. Diverse language may be used to describe similar findings, for example:

- The term pulling may be used to describe retractions. Retractions may be described as nasal flaring (particularly in infants), or by location (see below);
- Increased work of breathing may be indicated or it may be described by physical findings such as the use of accessory muscles, such as sub or intercostal muscles, supraclavicular or suprasternal. "Mildly" increased work of breathing or "minimal" retractions do not meet these criteria.
- Labored breathing, significant increased work of breathing, respiratory distress (moderate or greater), difficulty breathing, poor air entry (or air exchange or air movement) may all describe findings that meet this criterion. Grunting indicates that the child or adolescent is generating clearly audible sounds with each breath concomitant with apparent increased work of breathing. These may be found in the general description or respiratory section of the physical exam.
- Markedly (or severely) reduced breath sounds and descriptions of poor air movement are typically a part of an auscultation during the pulmonary exam.

Note 6: Documented evidence of the percent oxygen (O_2) saturation from a transcutaneous assessment can be located in a flow sheet, nursing, respiratory therapy, or physician/nurse practitioner/physical assistant note or may be recorded as part of the physical exam. The O_2 saturation may be obtained initially at triage and is often assessed periodically during the visit. Any O_2 saturation less than 90 satisfies the criteria.

Note 7: An ABG requires drawing of a blood specimen from an artery and is distinguished from a venous blood gas, which would not fulfill this criterion. This typically would be found in a laboratory results section of the record or commented as a finding in a clinician's note, such as a respiratory therapist, doctor, PA, NP, or RN. An ABG is typically comprised of at least a pO_2, pCO_2, and pH.

Note 8: Consultation with a pulmonary specialist or other asthma specialist requires both an order for such a physician consultation and evidence that the consultation occurred, including a note from the consultant specialist. Typically a consultation from a pulmonologist, pediatric pulmonologist, allergist, or pediatric allergist would fill this criterion.

Identify which ED visits meet at least one criterion for the Numerator. Maintain stratification variables.

Step 8: Conduct Chart Audit (Medical Record Review) to Assess Eligibility of Group C Hospitalizations for Inclusion in Denominator.

Within each stratification group (as determined above), identify the asthma hospitalizations for which there were not associated ED visits (Group C). An asthma ED visit and asthma hospitalization are said to be associated on the basis of the administrative data review only if they occur on the same service data and at the same institutions and if the hospital discharge date is after the ED service date. Such hospitalizations should have been included in Group B. Other hospitalizations require a review of the medical record to determine if they were admitted or transferred directly from an ED visit that was not otherwise in the sample (i.e., was not identified via the administrative data analysis).

The chart audit/medical record review seeks evidence that the child was admitted to the hospital directly from the ED or transferred directly from another hospital's ED. Evidence may include an ED note (physician, nurse, physician assistant, nurse practitioner), flow, or face sheet that indicates the disposition of the ED visit was hospital admission.

It may also include a note from within the hospitalization (including the admission note or any physician, nurse, physician assistant, nurse practitioner note), flow sheet, face sheet, or discharge summary that indicates that the hospitalization came directly from (was admitted from or transferred directly from) an ED.

In either case, the ED visit is only eligible for inclusion if the chart review specifies the date and institution of the ED visit sufficiently to assure that it can be uniquely identified and all duplication avoided. Others are excluded.

For example if an ED visit was identified in Group A and the resulting hospitalization appeared in Group C (either because of a different service date or different institution), the Group A ED visit would be included and the Group C hospitalization excluded as a duplicate (even though there was a preceding ED visit). If the child is uniquely included in the sample for that month and there is clear evidence that the admission came directly from an ED (e.g., was not transferred from another hospital after having been admitted from the ED) this measure can be satisfied.

De-duplication requires the elimination of any duplications that remain in the sample, considering the unit of analysis to be the ED visit. In other words, all ED visits must be included only once. Further, an ED visit identified via the hospitalization that also was a transfer from another ED visit already in the sample should have been removed as a duplicate. Similarly all hospitalizations lacking sufficient document that the child was admitted or transferred directly from an ED visit or lacking sufficient detail to allow confirmation that the ED visit referred to in the notes is not already in the sample elsewhere (e.g., from Group A) should have been removed.

Those Group C hospitalizations that can be identified as resulting from a unique (unduplicated) ED visit are included in BOTH the numerator and the denominator.

Step 9: Calculate and report the measure

a) For each age stratum, count the number of events in the sample that qualify for the denominator (N_D).
b) For each age stratum, count the number of events in the sample and in the denominator that qualify for the numerator (N_N).
c) For each stratum, calculate the percent of appropriate ED visits as Percent Appropriate = 100 * (N_N / N_D). Report to one decimal place.

Step 10: Report each stratification category listed below, that have an N of at least 50.

a) Race and ethnicity
b) Insurance type (Public/Medicaid, Private/Commercial, None, other)
c) Benefit type: HMO vs PPO vs FFS vs PCCM vs other
d) Urban Influence Code or UIC.
e) Level of poverty in the county of residence.

Step 11. Calculate and report 95% confidence intervals (using binomial distribution for each stratum) for each age specific stratum and for all of the Step 9 stratifications.

a) Calculate the standard error as the square root of each proportion by [1-the same proportion] divided by the number in the denominator.
b) Multiply the standard error by 1.96.
c) Subtract that value from the measured proportion. Report the greater of 0 and that number as the lower bound of the 95% confidence interval.
d) Add the product from b to the measured proportion. Use the lesser of that sum or 1 as the upper bound of the 95% confidence interval.

Figure 1.
Roadmap and overview of sample selection and measure calculation

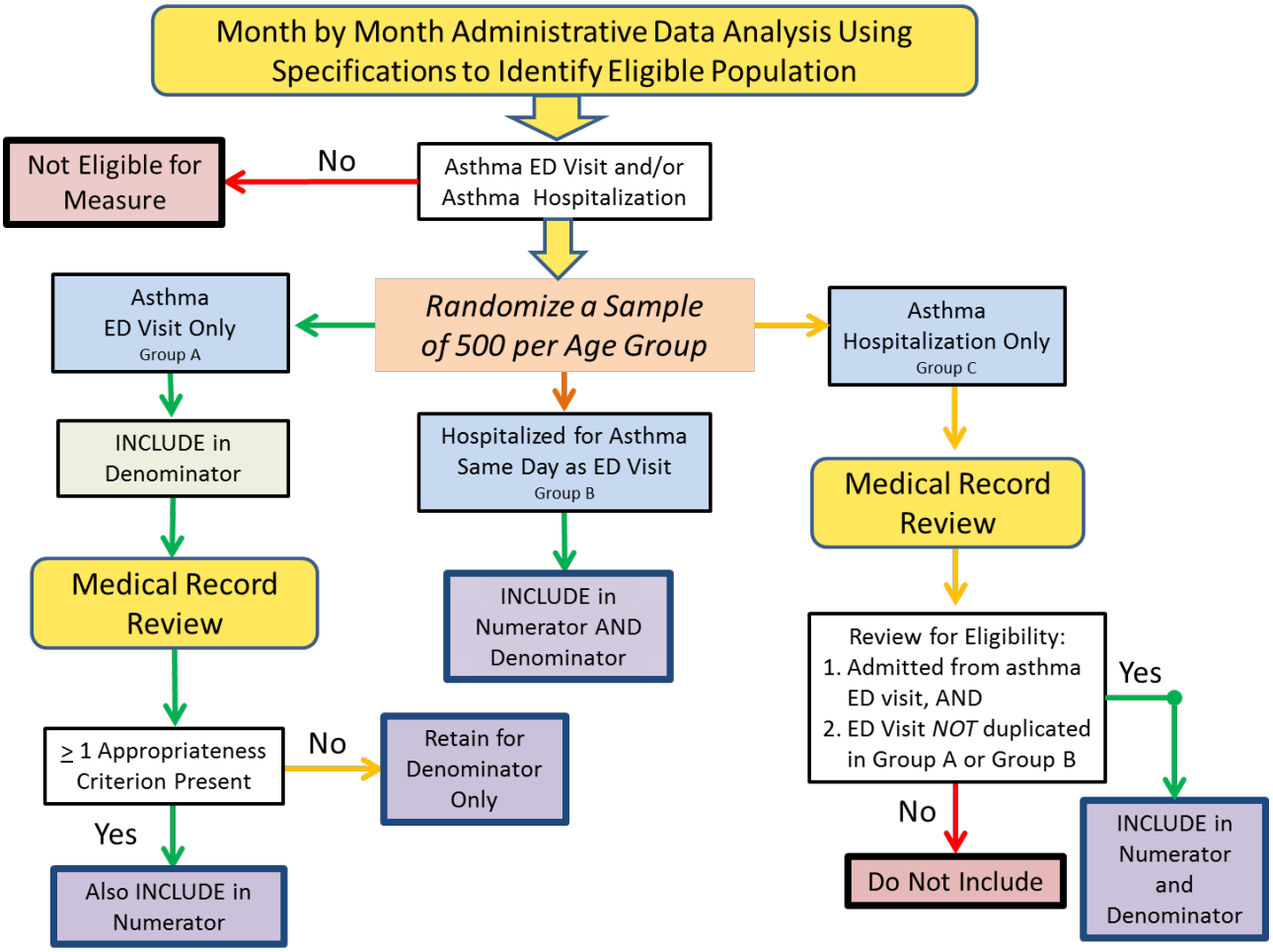

Figure 1. Notes:

- Determining eligibility for sample selection precedes determining eligibility for measure.
- On the basis of the Administrative Data Analysis, children who are potentially eligible for the measure will be identified and segregated into Groups A, B, and C (the blue boxes above).
- Children are eligible for Group B if three things are found in the administrative data: ED Visit; Hospitalization on same day and same institution; and Hospital discharge is after date of ED visit.
- National and NY State data suggest that approximately ¾ of childhood asthma hospitalizations are admitted from ED, that about 1 in 9 childhood asthma ED visits result in hospitalization and that children admitted from the ED may not have their ED visit coded in administrative data.
- Medical record review determines eligibility for numerator among the Group A children, all of whom have already qualified to be included in the denominator.
- Group B children are eligible for both the numerator and the denominator on the basis of administrative data analysis alone and do not require chart review.
- Medical record review determines eligibility for inclusion in the measure (denominator!) for Group C children. If they are eligible for the denominator (i.e. that have been admitted directly from an unduplicated ED visit) then they are also qualified for the numerator.

SECTION III.
IMPORTANCE OF THE MEASURE

In the following sections, provide brief descriptions of how the measure meets one or more of the following criteria for measure importance (general importance, importance to Medicaid and/or CHIP, complements or enhances an existing measure). Include references related to specific points made in your narrative (not a free-form listing of citations).

III.A. Evidence for General Importance of the Measure

Provide evidence for all applicable aspects of general importance, including but not limited to the following:

- Addresses a known or suspected quality gap or disparity in quality (e.g., addresses a socioeconomic disparity, a racial/ethnic disparity, a disparity for Children with Special Health Care Needs (CSHCN) and/or a disparity for limited English proficiency (LEP) populations.
- Potential for quality improvement (i.e., there are effective approaches to reducing the quality gap or disparity in quality).
- Prevalence of condition among children under age 21 and/or among pregnant women.
- Severity of condition and burden of condition on children, family, and society (unrelated to cost).
- Fiscal burden of measure focus (e.g., clinical condition) on patients, families, public and private payers, or society more generally, currently and over the life span of the child.
- Association of measure topic with children's future health—for example, a measure addressing childhood obesity may have implications for the subsequent development of cardiovascular diseases.
- The extent to which the measure is applicable to changes across developmental stages (e.g., infancy, early childhood, middle childhood, adolescence, young adulthood).

Asthma matters for pediatrics. [1-12] It is one of the most common chronic diseases in children, affecting an estimated 7.1 million children in the United States. [13] In 2011, 4.1 million children suffered from an asthma attack or episode. It is the second most common reason (after allergy) for children to be classified as having a special health care need, accounting for nearly 38.8% of such children. Pediatric asthma is more prevalent in minority populations. Lifetime prevalence rates of asthma in Hispanic and Black children are 12.4% and 15.8% respectively. [14]

We analyzed Healthcare Cost and Utilization Project (HCUP) data to estimate that children between 1 and 17 years old had more than 673,000 emergency department visits with asthma as the first diagnosis; almost 11% (or > 71,000) of these visits resulted in hospitalization. Considering all ages, asthma ED visits are common in all regions of the country, with a plurality in the South and fewer in the West. They

are relatively evenly split between teaching and non-teaching hospitals and nearly 86% of visits occur for patients who live in metropolitan areas. Specifically, about 56% of visits are in large metropolitan or suburban areas, 29% in smaller metropolitan areas and almost 15% in areas considered rural. Asthma exacerbations (including ED visits and subsequent hospitalizations) are consequential for the health and well-being of children and their families and may cost as much as $18 billion per year across all ages. [9-12]

Appropriate use of the emergency department has been debated for decades. In her seminal article nearly three decades ago, DeAngelis included an asthma attack as an appropriate indication for use of the ED.[15]

In this current context, AHRQ and CMS charged CAPQuaM to develop measures under the heading of "Overuse – ED asthma". We have previously developed measures that assess the rate of ED use for children with identifiable asthma that counts the number of children with identifiable asthma and the number who have at least one ED visit, and that look at connections with the primary care system before and after the index ED visit. With our proposed measure, CAPQuaM advances DeAngelis' work by implementing systematically-developed explicit criteria to assess whether or not there is information to document that the ED was the appropriate level of care for the specific presentation of a given child.

A child may present to the ED with asthma for any number of reasons ranging from acute and life-threatening respiratory distress to an acute exacerbation that may or may not respond readily to rescue medication to running out of medication to anxiety or uncertainty. Visits may be precipitated by exposure to an environmental trigger, inability to reach or access a lower level of care or clinical symptoms. The ED is typically a reliable and 24/7 source of care that may or may not be more convenient than other options. We seek to disentangle some of the complexity of reasons that children are in the ED with asthma by seeking to identify reasons that make the ED an appropriate level of care for that child at that moment. When such reasons are found we call the visit appropriate. When we are unable to identify such a reason, we term the visit questionable, recognizing that we are only specifying some of the potentially appropriate indications within this measure. Our measure for appropriate use of the ED for asthma exacerbations was developed using explicit criteria developed using the RAND/UCLA Appropriateness Method (RUAM) as part of CAPQuaM's 360 Degree Method. Appropriateness is distinct from assessing whether or not the ED visit could have been preventable in the counterfactual circumstance of idealized care.

The literature points to two general characteristics of asthma care delivery systems that correlate with ED utilization. One is the effective use of preventive and routine care measures, such as multidisciplinary practice or a medical home model, the presence of an asthma action plan, the use of controller medications supplemented by judicious use of rescue medications. [16-20] The other is the availability of primary care or urgent care visits as a step before ED use in the context of either a general pediatric or an asthma specialty practice. [20, 21] Conversely, a lack of comprehensive asthma care, which includes primary and secondary prevention schemas, and a lack of available urgent care services are both commonly cited as reasons for preventable ED visits. It has been demonstrated that

the children who used the ED underutilized primary care services [20] and it has also been demonstrated that interventions that attempt to provide comprehensive, multidisciplinary care are able to decrease ED utilization for asthma care. [22] We acknowledge that environmental management and control is a nonclinical opportunity to improve the quality of life for children with asthma and to reduce health care utilization, but do not focus on these issues in this submission.

High rates of asthma visits to the ED suggest widespread deficiencies in asthma care. The literature shows that lack of proper asthma care is disparate with minority children bearing undue burden. [23-25]

The literature also presents different perspectives on appropriate use of the ED for pediatric asthma. Pediatric asthma is one of the leading conditions when it comes to avoidable ED visits. [26] Asthma has been classified both as an avoidable hospitalization condition (AHC) and as an ambulatory care sensitive condition. This describes that many ED visits or hospital admissions could have been avoided with proper outpatient care. [26, 27] Poor outpatient care can be an outcome of a number of variables. As noted, the availability of primary care can reduce such inappropriate visits. [21, 26, 28] Parents may choose to come to the ED if they cannot get a timely appointment with their primary care provider, have had poor experience with their PCP, or feel the treatment in the ED is of a higher quality or safer than the ambulatory office. Parents may also panic when a child suddenly has trouble breathing and simply believe the child's symptoms require emergency care. A potentially preventable visit, however, is not the same as an inappropriate or unnecessary visit – sick asthmatic children may require ED care.

It is well understood that children who receive optimal asthma management and those who are well connected with their primary care practice are less likely to require an ED visit or a hospitalization than those who are less well managed or lack effective primary care. Well developed scientific guidelines exist. [29]

Reducing the relative number of ED visits during the care for asthmatic children remains a high priority on the national agenda and holds the promise of both financial savings and improved health-related quality of life. Overuse of the ED for all diagnoses is estimated to cost approximately $38 billion per year. [30] One study illustrated the financial burden of non-urgent ED visits by calculating that treatment of an upper respiratory infection cost twice as much in the ED as compared to a family practitioner's office. [31] Other detriments of ED overuse include overcrowding, long wait times, and an unnecessary workload on staff who work in a high pressure environment; overuse detracts from patients who truly need this level of care.

Assessing the extent to which ED use for asthma is appropriate can inform health policy, manpower planning, and clinical quality improvement activities. It can help to answer the question of how much of ED use potentially may be prevented by better management of the underlying asthma, versus how much requires other, process or structural improvements to reduce use of the ED when a lower level of care would meet the clinical needs of the child. Refractory asthma or those with unavoidable environmental exposures leading to an acute exacerbation requiring medical care are likely to be identified as appropriate, reminding us that *NOT* all asthma ED visits are preventable even with optimal care.

With a better understanding of ED use, health care organizations and policy makers could develop better informed approaches to optimizing services for children with asthma. And hopefully children and their families may increasingly be spared the inconvenience, risk, and costs of ED visits for asthma.

III.B. Evidence for Importance of the Measure to Medicaid and/or CHIP

Comment on any specific features of this measure important to Medicaid and/or CHIP that are in addition to the evidence of importance described above, including the following:

- The extent to which the measure is understood to be sensitive to changes in Medicaid or CHIP (e.g., policy changes, quality improvement strategies).
- Relevance to the Early and Periodic Screening, Diagnostic and Treatment benefit in Medicaid (EPSDT).[7]
- Any other specific relevance to Medicaid/CHIP (please specify).

Children with asthma comprise a critically important population for Medicaid.

Our analysis of the 2011 National Survey of Children's Health (NSCH) suggests that more than 2.65 million children age 2 and above in Medicaid have at one time been told they have asthma. Further, of all children whose parents report them to be in fair or poor health, 40% have asthma. Children with asthma also are 23% less likely than those without to have their health reported as very good or excellent. Asthma spans the country with rates among Medicaid children (NSCH) ranging from 10.1% in Alaska to 28.8% in Kentucky. As a point of reference, 22.2% of Medicaid children in NY State have been told they have asthma. Asthma is prevalent in white, black, and Hispanic children in Medicaid and in all age groups. Nationally, more than 35 of every 1000 Medicaid children will visit the ED for asthma, with about 11% resulting in hospitalization (using HCUP data).

Among children with special health care needs, using the 2007 National Survey of Children with Special Health Care Needs (NS-CSHCN), we found minority children to be overrepresented with asthma. 38% of children with asthma have public insurance. One quarter (26%) live in households under the federal poverty line, 28% under twice the federal poverty line, and only 24% have incomes more than four times the federal poverty line. Nearly three quarters of these children have at least one sibling, with more than one-third of those siblings also having a special health care need, using HRSA's screening tool to identify a CSHCN. We also found that racial minorities, lower income, and household educational attainment were independent predictors of ED utilization among children with asthma. Our analysis of New York State Medicaid data also shows about a 2.5 fold increase in the rate of using the ED of non-Hispanic Blacks compared to non-Hispanic Whites (non-Hispanic Black > all Hispanic > Non-Hispanic White > Asian). Asthma matters for all sorts of children in Medicaid.

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[7] The EPSDT is a comprehensive set of benefits available to children and youth under age 21 who are enrolled in Medicaid. For more information, see http://www.healthlaw.org/images/stories/epsdt/3-ESDPT08.pdf.

A study compared children insured by Medicaid to children insured by commercial payers in the same health maintenance organization and found that Medicaid-insured children were 1.4 times more likely to visit the ED for asthma and 1.3 times more likely to be hospitalized for asthma. [32] In addition, almost half of all hospitalizations of children for asthma are billed to Medicaid [33]. Recent estimates using NHAMCS data peg the overall costs of ED for childhood asthma at $272 million in 2010 [34], even though their estimate of the number of ED visits is less than our estimation, which used HCUP data. Asthma ED use matters for Medicaid programs. Evidence from Oregon suggests that Medicaid ED visits increase with Medicaid expansion. [35] There may be supply shortages of PCPs, or some doctors may be unwilling to see Medicaid patients.

ED use and hospitalization are considered to be potentially undesirable outcomes of asthma care. Some of these outcomes are challenging to prevent, resulting from refractory disease, unavoidable exposures, or environmental conditions that are outside the realm of clinical prevention. Many visits are avoidable, predicated upon optimal care delivery – that is, appropriate well-coordinated and continuous primary care that incorporates shared-decision making to optimize individual management using effective controller medications as appropriate, articulated in a written asthma management plan. Others are preventable when high quality acute care services are readily available. Environmental control writ small (e.g., avoiding exposure to cigarette smoke, wrapping mattresses in protective covers) and writ large (e.g., air quality) can reduce asthma exacerbations – these activities are typically outside of the clinical realm. [36-42]

We have previously submitted to the PQMP a measure that uses an algorithm validated by an expert panel to identify children who have asthma that had required health care services in the recent past and their asthma is sufficient that it should have been identified and managed by the health care system. Only children who have such identified asthma are considered eligible for this current measure. Previously we used 2010 and 2011 data and found that more than 196,000 such children in New York State have identifiable asthma; more than forty thousand of those children generated nearly 60,000 asthma-related ED visits in 2011. We have further submitted measures that assess proxies for linkages between the primary care and ED systems. This measure fills a gap by further distinguishing those ED visits for which one can identify in the medical record an indication that makes the ED visit an appropriate level of care and those for which such an indication cannot be identified. We call the former circumstance “appropriate” and the latter “questionable” to reflect our uncertainty about legitimate reasons for using the ED that may not be recorded routinely in the medical record (including several patient-centered reasons identified by our expert panel).

A recent RAND systematic review of non-urgent ED use lamented the lack of a standardized definition for what constitutes a non-urgent ED visit. [43] In the context of our assignment to develop measures related to “asthma ED, overuse” we have translated the RAND observation into a well-specified approach to assess whether or not the ED is an appropriate level of service for a specified child given the totality of their current circumstances. We assess this using explicit criteria developed by an expert panel incorporated into a modified RAND-UCLA Appropriateness Method.

As a common chronic illness characterized by remissions and potentially preventable exacerbations that may require costly services such as ED visits, undesirable utilization outcomes for asthma have been a frequent target for measurement for three decades. Reducing the relative number of ED visits during the care for asthmatic children remains a high priority on the national agenda. The universal delivery of optimal asthma care has the potential to lower costs and improve quality of life. Understanding which ED visits represent failures of clinical prevention and which instead represent a mismatch of service level to clinical need can help to move these goals forward. The submitted measure is a step in this direction.

III.C. Relationship to Other Measures (if any)

This measure is unique in that it describes a qualitative aspect of emergency departments for identifiable pediatric asthma, what proportion can have found to have documented reasons that make the visit appropriate. This measure assess both outcomes (ED visits) and process (appropriateness of level of care). It uses explicit appropriateness criteria developed by an expert panel that adopts a modified Delphi RAND/UCLA method. This method of development borrows from other development of appropriateness measures for medical and surgical procedures. [44, 45] This measure is part of a measure set developed by CAPQuaM and intended to distinguish the ED as an appropriate level of care. The definition of appropriate represents the judgment of the expert panel regarding whether or not the ED represents an appropriate level of care for the given clinical scenario. This measure is unique in that, it assesses the appropriateness of a level of care for a specific chronic medical condition rather than the likely usefulness of a specific diagnostic procedure or therapeutic maneuver. Even inappropriate ED visits may be effective with valuable benefits for the patient. They are not, however, efficient.

This measure complements our asthma ED outcomes measures (one a count measure and one a rate) and the definition of events and of identifiable asthma are identical. In that sense this measure is well-harmonized. Unlike the CAPQuaM asthma ED measures submitted to date, this is a hybrid measure requiring chart review as well as administrative data analysis.

Section IV.
Measure Categories

CHIPRA legislation requires that measures in the initial and improved core set , taken together, cover all settings, services, and topics of health care relevant to children. Moreover, the legislation requires the core set to address the needs of children across all ages, including services to promote healthy birth. Regardless of the eventual use of the measure, we are interested in knowing all settings, services, measure topics, and populations that this measure addresses. These categories are not exclusive of one another, so please indicate "Yes" to all that apply.

a. Care Setting – ambulatory	Yes	
b. Care Setting – inpatient	No	
c. Care Setting – other—please specify	Yes	Other-Emergency Department
d. Service – preventive health, including services to promote healthy birth	No	
e. Service – care for acute conditions	Yes	
f. Service - care for children with special health care needs/chronic conditions	Yes	
g. Service-other (please specify)	No	
h. Measure Topic -duration of enrollment	No	
i. Measure Topic – clinical quality	Yes	
j. Measure Topic – patient safety	No	
k. Measure Topic – family experience with care	No	
l. Measure Topic – care in the most integrated setting	Yes	
m. Measure Topic – other (please specify)	No	
n. Population – pregnant women	No	
o. Population – neonates (28 days after birth) (specify age range)	No	
p. Population – infants (29 days to 1 year) (specify age range)	No	
q. Population – pre-school age children (1 year through 5 years) (specify age range)	Yes	2-5
r. Population – school-age children (6 years through 10 years) (specify age range)	Yes	6-10
s. Population – adolescents (11 years through 20 years) (specify age range)	Yes	11-20
t. Population – other (specify)	No	2-21
u. Other category (please specify)		

SECTION V.
EVIDENCE OR OTHER JUSTIFICATION FOR THE FOCUS OF THE MEASURE

The evidence base for the focus of the measures will be made explicit and transparent as part of the public release of CHIPRA deliberations; thus, it is critical for submitters to specify the scientific evidence or other basis for the focus of the measure in the following sections.

V.A. Research Evidence

Asthma is one of the most common indications for emergency department (ED) visits by children. [46] Our analysis of AHRQ's Healthcare Cost and Utilization Project (HCUP) data found that children between 1 and 17 years old had more than 673,000 ED visits for asthma with almost 11% (or > 71,000) resulting in hospitalization.

While ED use and its potential overuse has been debated for decades, the fact that the number of ED visits in the US is increasing is clear: at approximately 134 million [47] visits per year, one estimate suggests that 56% of all visits were avoidable [48] and another that overuse of the ED costs $38 billion annually. [47] The New England Healthcare Institute rates ED overuse as the fourth largest category of healthcare waste, asserting that the ED is serving as overflow for an overburdened primary care system. [48] Undesirable consequences of questionable use includes direct financial costs, ED overcrowding and delayed receipt of urgent and emergent care, fragmentation of care, lost productivity of children (school days) and parent/caregivers (work), side effects from management, and potentially, avoidable hospitalizations.

Evidence suggests that hospitalizations in children with asthma vary systematically by how well-equipped that community is to provide primary care, and by the quality of primary care delivered. [24, 49, 50] There is widespread literature illustrating that ED visits and hospitalizations are each undesirable utilization outcomes from poorly managed asthma. There is not a large literature that assesses whether or not pediatric ED visits were appropriate. [15, 51]

This topic is salient for Medicaid. Medicaid enrollment has been increasing since the economic recession in December 2008 and is expected to grow substantially as intended by the Affordable Care Act. The Congressional Budget Office estimates the total number of enrollees to approach 93 million by 2024, of which 41% are projected to be children. [52] Recent evidence shows that increases in ED visits go hand in hand with increases in Medicaid enrollment. [35, 53]

A body of literature has explored the value and feasibility of measuring the appropriateness of medical activities using data available in the medical record. [54-57] Early work in adults included assessment of hysterectomy, carotid endarterectomy and cardiac interventions. An independent research project brought the construct of appropriateness to children [58], while Kleinman and colleagues were the first to assess the appropriateness of specific pediatric procedures. [59, 60] A later study demonstrated the feasibility of medical record data for such an assessment. [61] DeAngelis pioneered studies of what constitutes a good reason to use the ED. [15] All of these studies used a definition of appropriateness that compared benefit to likely risk without specific consideration of costs. The need for more studies looking for overuse

was recently reviewed. [62] RAND type Delphi panels are accepted around the world as a method for developing criteria to assess appropriateness. [63-65]
Research demonstrates that:

- ED visits are an important issue for Medicaid, with clinical and financial consequences;
- An overcrowded primary care system contributes to ED use for non-emergent and even non-urgent conditions
- Pediatric hospitalizations for asthma vary by primary care availability and quality
- ED visits are common for children with asthma, including those in Medicaid
- Assessment of appropriateness using information in the medical record is a well-established and validated method that has been successfully applied to children.

The literature suggests that a measure that assesses whether or not the ED is an appropriate level of care for a child with asthma at the time that they present has intrinsic value. Such a measure would:

- Characterize the process of care in a way that assesses whether a particular ED visit represents overuse
- Allow the outcomes of asthma care to be better characterized in a manner that describes performance and promotes targeted improvement. Inappropriate ED visits represent failures of primary care delivery, availability and/or access. Appropriate visits may represent a failure to control asthma. These have distinct and distinguishable meanings.

An abstract describing the proposed measure was peer-reviewed and subsequently presented to a national audience at AcademyHealth 2014 Annual Research Meeting in San Diego in the “Measuring the Safety, Quality, and Value” section. Feedback was positive regarding the methods, measures, ethics, and importance of this measure.

Research evidence supports the importance and need for our proposed measure that assesses whether the ED represents an appropriate level of care for children with asthma who are seen in the ED.

V.B. Clinical or Other Rationale Supporting the Focus of the Measure (optional)

Asthma outcomes are sensitive to clinical management. The National Asthma Education and Prevention Program (NAEPP), coordinated by the National Heart, Lung, and Blood Institute (NHLBI), released guidelines in 2007 that are evidence based and offer well-demonstrated opportunities to improve care. [66] Care is less than optimal and can be improved. [67, 68] Effective clinical, population, community, and school based interventions are also possible. [66, 69-90] A team of researchers collaborating across Boston, Rochester, and New Haven have demonstrated differences in asthma hospitalization across communities that are associated with structures and processes of care. [24, 49, 50, 91] While a few children who show up to the ED with asthma are there because of intractable disease that is optimally managed, most do not. They may not need to be in the ED (overuse), are there because of suboptimal management

prior to coming, or have been exposed to an environmental trigger that may or may not have been avoidable.

We have elsewhere in this document demonstrated the general importance of asthma for child health, health care and quality.[92] Similarly, we have demonstrated elsewhere the importance of ED visits as an outcome measure in asthma and the value of distinguishing those that are for meaningful exacerbations requiring ED care, from those that do not. And asthma visits cost a lot of money to Medicaid throughout the country. [34]

SECTION VI.
SCIENTIFIC SOUNDNESS OF THE MEASURE

Explain the methods used to determine the scientific soundness of the measure itself. Include results of all tests of validity and reliability, including description(s) of the study sample(s) and methods used to arrive at the results. Note how characteristics of other data systems, data sources, or eligible populations may affect reliability and validity.

VI.A. Reliability

Our approach to developing this measure stems from several vibrant and scientifically sound traditions. We first discuss research involving the soundness of our data sources, which include both administrative data to identify cases (and a fraction of numerator qualifications) and chart review (medical record audit) to confirm some denominator inclusions and to identify most numerator inclusion. This is a generally accepted and standard approach with acceptable reliability. We go on to talk about the assessment of appropriateness, which is also highlighted in the research evidence section (V.a.).

Brook and Davies trace the early history of quality measurement and remind us of the importance of medical chart audit as an approach to quality measurement. [93] Lohr and Brook at RAND and Roos in Manitoba, Canada pioneered the use of electronically-available administrative data (generated by routine health care operations, such as billings) as proxies for health care processes. Administrative data carefully used reduces burden of quality measurement. [94-98]

As the National Committee for Quality Assurance (NCQA) developed the Healthcare Employee Data Information Set (HEDIS) as the de facto measurement system for managed care, attention turned to the use of administrative data for routine performance measurement. Research demonstrated that administrative data could have a role in producing quality measures, with augmentation by chart review often necessary. Administrative data are not typically sufficient for detailed clinical assessment.[99-103] HEDIS developed a hybrid approach, using administrative data and chart review that this measure borrows heavily from. [104, 105]

The explicit criteria that we use were developed using a slightly modified version of the RAND/UCLA Appropriateness Method that maintained the key aspects of that approach, including a detailed literature review, a multidisciplinary and geographically diverse expert panel comprised of both clinicians and researchers, and the two Round modified Delphi Process. The general reliability of this approach is well established. [56, 57] It has been applied successfully to pediatric services previously. [59, 60, 106] In order to enhance the validity of the meaning of appropriate, we have limited criteria used for this measure to those items whose median rating is 8 or 9, the two highest ratings.

In our testing of the criteria during chart audit used a paper data collection instrument that was largely a checklist of yes/no for the various items. After a brief training by the physician who organized the testing three non-clinical research assistants (one MPH, 2 Bachelors) conducted chart audits. Kappa on 10 random charts with the gold standard of the physician lead, were .696, .577 and .593

respectively, with a group kappa of .431. A second training session included identifying potential synonyms, particularly for labored breathing, such as “in respiratory distress”, “notably increased respiratory effort”, “nasal flaring”, and “ increased work of breathing or (WoB).” Synonyms for markedly decreased breath sounds were defined to include poor “air exchange” or “air entry.” A subsequent re-evaluation of kappa on 10 different random charts found kappas with the physician lead to be .969, .954 and .938, with a group kappa of .923, indicating excellent agreement in the reliability of the chart audit to identify numerator events after two training sessions with review practiced in between.

Testing our administrative data analysis approach in NY State Medicaid (analyses performed by the NY State Dept of Health), we identified 62,052 ED visits or hospitalizations for asthma, of which 59,469 (95.8%) were identified using ED data alone and 2,583 on the basis of hospital codes alone. A distinct analysis conducted for CAPQuaM by the NY State DoH team using SPARCS data found that approximately 81% of all Medicaid hospitalizations for asthma came from the ED. Performing the calculations suggests that failure to look at hospitalizations for asthma in addition to ED visits would miss 2087 ED visits in the denominator, all of which would also qualify for the numerator.

VI.B. Validity

Validity of the measure is the extent to which the measure meaningfully represents the concept being evaluated. The method for establishing the validity of a measure will depend on the type of measure, data source, and other factors.

Explain your rationale for selecting the methods you have chosen, show how you used the methods chosen, and provide information on the results (e.g., R for concurrent validity).

2

The reliability section above also contains information related to validity.

This measure assesses the appropriateness of the ED as a level of care for children with asthma who present to the ED with a primary or secondary diagnosis of asthma. In the reliability and research evidence sections we have described the appropriateness method and its validity. We have used rigorous and transparent methods to assemble a national expert panel that included pediatricians, family physicians, pediatric and general emergency room specialists, a pediatric pulmonologist and a pediatric allergist from practices and medical schools around the country. This work was conducted in collaboration with national clinical societies (AAP, AAFP) and CAPQuaM’s diverse other partner organizations, including NY State DoH/Medicaid. NCQA is an important technical consultant and partner. The specific criteria that we operationalize in this measure were all rated by the expert panel with a median score of 8 or 9 on a 9 point scale (9 high) as circumstances for which the ED is an appropriate level of care. The use of Expert Panels has been demonstrated to be useful in measure development and health care evaluation, including for children. [107]

Use of the medical record as a valid source of information to judge appropriateness is well accepted. [108] Chart audits are used frequently to generate research in Emergency Medicine. [109, 110]

We worked closely with our NY State DoH/Medicaid partners to develop the specifications for identifying hospitalizations and emergency department visits in administrative data. Our specifications borrow heavily from approaches pioneered by HEDIS, including structuring this as a hybrid measure. We analyzed HCUP data and NY State data to determine that to identify all ED visits that result in hospitalization we needed to seek out hospitalizations as well. When we find hospitalizations in administrative data we seek evidence that it resulted from an ED visit before including it in the denominator. Based on NY State data, about 80.8% of all asthma hospitalizations in Medicaid were admitted from the ED. National HCUP data find a slightly smaller percentage.

We have described in a previous PQMP measure submission the criteria for identifiable asthma, which also were developed using guidance from the expert panel. Further, we have found that our definition identifies approximately double the number of children as the (intentionally) restrictive HEDIS persistent asthma definition and a bit more than half of the number of children with asthma believed to be in NY Medicaid. As such it appears to succeed in finding an intermediate denominator that is broad enough to have meaning across the spectrum of asthmatics who get sick but not to include either children whose initial presentation is in the ED or whose asthma is very mild and doesn't require ongoing management.

CAPQuaM's 360 degree method is highly engaged with collaborators and partners, and is supported by the literature. Potential measures emerge from the process and are tested to the extent that time and resources permit. For this measure we conducted a single site age-stratified chart audit of patients with asthma seen in Mount Sinai's Emergency Department. Reliability information regarding our chart audit is described in the reliability section above.

We randomly identified up to 3 ED visits per child over a four year period (October 2009 – November, 2013). Inclusion criteria included an ED visit with asthma as a primary or secondary diagnosis as documented in the medical record. We developed 3 samples stratified by age: 2-5 years, 6-11 years, and 12-18 years.

For children 2-5: 181 of 335 audits (54.0%) were deemed appropriate based upon information in the chart audit. Reasons for meeting the criteria included low oxygen saturation (2.1%), referral from their PCP (8.4%), and various manifestations of respiratory distress (labored breathing/retractions 46.6%, accessory muscle use 13.4%, markedly decreased breath sounds 13.1%). No arterial blood gasses or specialist consultations in the ED were ordered. 14.0% were admitted to the hospital.

For children 6-11: 209 of 477 audits (43.8%) were deemed appropriate based upon information in the chart audit. Reasons for meeting the criteria included low oxygen saturation (1.9%), referral from their PCP (4.4%), and various manifestations of respiratory distress (labored breathing/retractions 36.1%, accessory muscle use 7.5%, markedly decreased breath sounds 15.9%). No arterial blood gasses or specialist consultations in the ED were ordered. 11.5% were admitted to the hospital.

Adolescents aged 12-18: 165 of 341 audits (48.4%) were deemed appropriate based upon information in the chart audit. Reasons for meeting the criteria included

low oxygen saturation (0.3%), referral from their PCP (2.3%), and various manifestations of respiratory distress (labored breathing/retractions 35.1%, accessory muscle use 6.4%, markedly decreased breath sounds 22.5%). No arterial blood gasses or specialist consultations in the ED were ordered. 12.9% were admitted to the hospital.

Appropriateness varied by age (Chi^2=8.2,p=.02), with younger (p=.01) and school aged (p=.01) children each being significantly different; Adolescents experienced a level of appropriateness intermediate to the other two groups and were not significantly different from them when combined (ie comparing Adolescents to All others). We also found racial differences with Hispanics at 44.1% appropriateness, non-Hispanic Blacks at 51.3%, Whites at 56.5% and all others at 72.2%. Chi square with 3 degrees of freedom was 15.4, with p=.0015. The appropriateness of ED visits for Hispanic children was less than for other children (p=.002).

In summary, this measure was developed using a rigorous process that integrated the literature, stakeholder perspectives, an expert panel, and a rigorous testing process. We have previously demonstrated the validity of identifiable asthma as a meaningful construct. We use well accepted methods to identify emergency department visits, and we performed a rigorous test to demonstrate both the reliability of the chart audit and the capacity to identify variations in performance across categorical variables such as age and race.

SECTION VII.
IDENTIFICATION OF DISPARITIES

CHIPRA requires that quality measures be able to identify disparities by race, ethnicity, socioeconomic status, and special health care needs. Thus, we strongly encourage nominators to have tested measures in diverse populations. Such testing provides evidence for assessing measure's performance for disparities identification. In the sections below, describe the results of efforts to demonstrate the capacity of this measure to produce results that can be stratified by the characteristics noted and retain the scientific soundness (reliability and validity) within and across the relevant subgroups.

VII.A. Race/Ethnicity

Our medical chart audit found that the measure varies by race/ethnicity. Hispanic children had higher rates of questionable use of the ED (55.9% of visits) when compared to non-Hispanic children (46.8%), p=.002. Black children showed a trend toward more questionable use compared to all other children (53.6% questionable vs 48.7%, p=.10).

VII.B. Special Health Care Needs

The Maternal and Child Health Bureau has defined children with special health care needs (CSHN) as children "[w]ho have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally." [111] Considering this definition, children with identifiable asthma typically are children with special health care needs. This measure describes the care for such children.

VII.C. Socioeconomic Status

The measure is specified to be stratified in 2 ways to assess aspects related to socioeconomic status: Public versus Commercial Insurance, and by 5 strata defined by the percent of the population in poverty in their county of residence. During our feasibility assessment phase, we asked institutions whether the payment source was available in the medical chart (EMR or paper) and the difficulty of abstracting this information from those charts. We found that payment source is generally available in the medical chart and is overall not difficult to abstract. As we expect this measure primarily to be generated by insuring entities, these data are expected to be present and available in the administrative data. Zip codes of residence are typically available in both medical charts and administrative data sets and can be linked to county of residence as described in the specifications. Ecological data such as the five poverty strata that we specify, have been found to be independent predictors of health outcomes and are readily available using USDA data. [112] The five strata represent the 3 quartiles of lowest poverty each as one stratum, and the highest quartile divided into 2 strata, the 75th-90th percentiles and the highest 10%. In New York State only

quartiles 1 through 3 are present, so we were not able to demonstrate the sensitivity of the measure specifically, but we were able to demonstrate the practicality of the method.

VII.D. Rurality/Urbanicity

These measures are specified to be reported by Urban Influence Codes (UIC), which have been developed by the USDA based on a number of criteria to describe the levels of urbanicity and rurality. This is intended not only to report within plan differences but to allow for aggregation as appropriate. While each UIC has its own meaningful definition, some researchers choose to aggregate various codes. We recommend consideration of the aggregation schema of Bennett and colleagues at the South Carolina Rural Research Center. [113] Their aggregation scheme brings together Codes 1 & 2 as Urban; 3, 5, & 8 as micropolitan rural; 4, 6, & 7 as rural adjacent to a metro area; and 9, 10, 11, & 12 as remote rural. We observe that UIC 5 might as well be aggregated with 4, 6, & 7 as an adjacent rural area. Further, while this approach to rurality does not map exactly to the population density based definition of frontier (< 6 persons per square mile) as articulated in the Affordable Care Act, use of such categories is consistent with the ACA's intent that the Secretary ask that data that are collected for racial and ethnic disparities also look at underserved frontier counties. Frontier health care may be approximated by analysis of the remote rural categories. [114]

This judgment was confirmed after CAPQuaM consulted with Gary Hart, Director of the Center for Rural Health at the University of North Dakota School of Medicine & Health Sciences, who is heading a HRSA-funded project to develop new methods to analyze frontier health. We clarified that his work suggests that UIC 9-12 is the best overall approach to using county level data to study frontier health. Inclusion of UIC 8 would make the analysis more sensitive to including frontier areas but at a meaningful cost in sensitivity.

Those interested in care specific to large cities may wish to aggregate the rural area and analyze UIC 1 and 2 separately. Frontier health care may be approximated by analysis of the remote rural categories. [114] The New York State Medicaid data were sensitive to urbanicity with higher rates of ED utilization in the most urban areas and lowest in the most rural areas and other areas intermediate between the two.

For aggregation and as an imperfect approximation one can also group as urban (1 and 2), suburban (3-6) and rural (7-9). This is what we have used for our NY Medicaid analysis to demonstrate that variations are observed for this measure using UIC codes. For example, both medication measures and the 6 month primary care visit measure are met for 13.8% (N=806) of those in rural counties, 14.7% (N=4066) of those in suburban counties, and 16.9% (N=26327) of those in urban counties.

VII.E. Limited English Proficiency (LEP) Populations

We have not tested or specified this measure for this specific purpose. There is no reason the measure would not apply equally well for those in LEP populations.

SECTION VIII.
FEASIBILITY

VIII.A. Data Availability

VIII.A.1. What is the availability of data in existing data systems? How readily are the data available?

The definitions were specified to allow their use with data elements that are usually available in electronic form as administrative data to a responsible entity such as a health plan or state Medicaid program. While zip code is sometimes a hidden or non-public variable when such data sets are released, it generally is available to a responsible entity. While race and ethnicity are typically available to Medicaid programs and are in institutional medical records (e.g. hospitals), they may or may not be in an individual physician practice's chart. They are often but not always recorded in insurance databases. We have data from a feasibility study that confirms that zip code, race, and ethnicity data elements are generally available in the hospital medical chart, frequently electronically. The rapid expansion of data gathering from electronic health charts can help augment administrative data review in measure assessment.[115] This is particularly helpful when determining the population denominator. The CHIPRA legislation that funded this work indicates that measures are to be able to assess racial and ethnic disparities. We have demonstrated that NY State Medicaid is able to identify and utilize the criteria for finding children with identifiable asthma, assessing their length of continuous enrollment, and identifying emergency department visits and hospitalizations with a first or second diagnosis of asthma as intended and with the anticipated limitations that were outlined.

Qualification for inclusion in the numerator typically will be identified via chart audit, using a slight variation from the hybrid schemes pioneered and made feasible by HEDIS. The appropriate use criteria were derived from a set developed by an expert panel. The entire set includes:

1) Hospitalization directly from the ED;
2) Documented physical findings consistent with respiratory distress, including:
    a) Labored breathing with retractions and/or evidence of accessory muscle use;
    b) Markedly decreased breath sounds;
3) O_2 saturation level less than 90 percent on percutaneous assessment;
4) An ABG obtained (or ordered);
5) Consultation obtained with a pulmonologist asthma specialist, an order of an arterial blood gas (ABG), or a consult with a pulmonary or asthma specialist.
6) Parent/caregiver referred to the ED after evaluation from the PCP or other office/clinic;
7) Parent/caregiver report of administering two or more doses of inhaled rescue medications without meaningful clinical improvement;
8) Parent/caregiver report that the child was in a pre-defined "red zone" of peak flow measurement as part of an asthma action or similar plan; or,

9) Parent/caregiver report of a rapid and life-threatening deterioration after a similar prior episode. This criterion is not included in the specifications for this measure.

Referring to each criterion by its number:

1) May be found in administrative data, and when not is in chart;
2) Needs to be documented from chart audit as part of the note of an assessing clinician including physician, nurse, nurse practitioner, physician's assistant, or respiratory therapist;
3), 4), 5) Identifiable in chart audit in clinical notes, results, vital signs, or orders;
6), 7), 8) Should be documented in history of present illness by one or more clinicians, and thus be found in chart audit;
9) Would be better obtained via patient centered data collection and is not included in this measure.

VIII.A.2. If data are not available in existing data systems or would be better collected from future data systems, what is the potential for modifying current data systems or creating new data systems to enhance the feasibility of the measure and facilitate implementation?

One limitation of the use of medical charts is that documentation habits vary by institutions and by clinicians. Once this measure achieves more widespread use there may develop a rationale for enhancing electronic data in electronic medical records to reduce the burden of data collection. There are no technical barriers to incorporating structured fields to help assess the appropriateness of the visits in conjunction with the criteria outlined above and implemented in this measure.

VIII.B. Lessons from Use of the Measure

VIII.B.1. Describe the extent to which the measure has been used or is in use, including the types of settings in which it has been used, and purposes for which it has been used.

The measure is not currently in use.

VIII.B.2. If the measure has been used or is in use, what methods, if any, have already been used to collect data for this measure?

N/A

VIII.B.3. What lessons are available from the current or prior use of the measure?

The measure is not currently in use.

SECTION IX.
LEVELS OF AGGREGATION

CHIPRA states that data used in quality measures must be collected and reported in a standard format that permits comparison (at minimum) at State, health plan, and provider levels. Use the following table to provide information about this measure's use for reporting at the levels of aggregation in the table.

For the purpose of this section, please refer to the definitions for provider, practice site, medical group, and network in Section XVI. Glossary of Terms.

If there is no information about whether the measure could be meaningfully reported at a specific level of aggregation, please write "Not available" in the text field before progressing to the next section. Table IX-1 shows the questions (in columns) about the measure's use at different levels of aggregation for quality reporting (in rows) included in the CPCF.

Table IX-1. Questions about the measure's use at different levels of aggregation for quality reporting

Level of aggregation (Unit) for reporting on the quality of care for children covered by Medicaid/CHIP[†]	**Intended use: Is measure intended to support meaningful comparisons at this level? (Yes/No)**	**Data Sources: Are data sources available to support reporting at this level?**	**Sample Size: What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**	**In Use: Have measure results been reported at this level previously?**	**Reliability & Validity: Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**	**Unintended consequences: What are the potential unintended consequences of reporting at this level of aggregation?**
State level*: Can compare States	Yes	Yes	Yes			
Other geographic level: Can compare other geographic regions (e.g., MSA, HRR)	Yes	Possibly	.Not assessed (NA)			
Medicaid or CHIP Payment model: Can compare payment models (e.g., managed care, primary care case management, FFS, and other models)	Yes	Yes	Yes			
Health plan*: Can compare quality of care among health plans.	Yes	Yes	.Not assessed (NA)			
Provider-level* Individual practitioner: Can compare individual health care professionals	No					
Hospital: Can compare hospitals	Yes	Not without other (billing) data	.Not assessed (NA)			This is a descriptive measure of hospital practice rather than an accountability measure.
Practice, group, or facility:** Can compare: (i) practice sites; (ii) medical or other professional groups; or (iii) integrated or other delivery networks	Yes	Yes	.Not assessed (NA)			Better for integrated delivery systems. Payers could look at large practices to assess appropriateness of ED use for those practices, but there is danger without large sample sizes.

[†] There could be other levels of reporting that could be of interest to Medicaid agencies such as markets and referral regions.

* Required in CHIPRA legislation.

** There is no implication that measures that are applicable at one level are automatically applicable at all three of the levels listed in this row.

SECTION X.
UNDERSTANDABILITY

This measure assesses whether or not an ED visit for a child with identifiable asthma meets criteria such that the ED can be identified as an appropriate level of care for that child in the given clinical circumstances.

As such this measure is uniquely informative. It can help stakeholders to understand the extent to which ED visits for children with asthma result from potentially inappropriate use – that is to say a lower level of care could have been expected to safely and effectively provided the care that the child needed -- and the extent to which ED visits represent an appropriate level of care. These latter are potentially preventable and represent both service use and potential health threat for the child/adolescent. It helps to distinguish between potential failures in the management of the chronic disease asthma (whether due to suboptimal care, challenging disease, or environmental exposure, etc), and issues of car organization or delivery, such as insufficient availability of primary care to provide acute care services or misunderstanding by families or clinicians about the circumstances for which the ED is indicated for children with asthma.

In the language of this measure we term visits that are potentially inappropriate to be of "questionable" appropriateness. We do this as an explicit acknowledgement that certain information that the expert panel considered helpful to assess appropriateness are not routinely recorded in the medical record: we do not expect that circumstance to be encountered frequently relative to other indications.

The distinction between appropriate and questionable ED visits can inform accountability considerations as well as improvement activities. The appropriateness criteria are straightforward indicators developed using an adaptation of the RAND/UCLA Appropriateness method. These criteria assess the clinical need for the level of care provided and should be readily understood by a wide variety of stakeholders from patients to clinicians to health planners.

SECTION XI.
HEALTH INFORMATION TECHNOLOGY

Please respond to the following questions in terms of any health information technology (health IT) that has been or could be incorporated into the calculation of the measure.

XI.A. Health IT Enhancement

Please describe how health IT may enhance the use of this measure.

Integrated administrative data sets that include clinical services (billing, procedure, diagnosis codes, pharmacy data, and patient demographics), including patient (parent) reported race/ethnicity, and state and county of residence will enhance use of this measure. Incorporation of appropriateness criteria into defined fields in EHR would support e-measure development, as could development of a patient-centered data collection instrument.

XI.B. Health IT Testing

Has the measure been tested as part of an electronic health record (EHR) or other health IT system?

Not tested for HIT. Tested using administrative data and with manual review of EHR data.

XI.C. Health IT Workflow

Please describe how the information needed to calculate the measure may be captured as part of routine clinical or administrative workflow.

Not applicable

XI.D. Health IT Standards

Are the data elements in this measure supported explicitly by the Office of the National Coordinator for Health IT Standards and Certification criteria (see: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_ifr/1195)? If yes, please describe.

No

XI.E. Health IT Calculation

Please assess the likelihood that missing or ambiguous information will lead to calculation errors.

Not specified for HIT calculation

XI.F. Health IT Other Functions

If the measure is implemented in an EHR or other health IT system, how might implementation of other health IT functions (e.g., computerized decision support systems in an EHR) enhance performance on the measure?

Not Applicable

SECTION XII.
LIMITATIONS OF THE MEASURE

Describe any limitations of the measure related to the attributes included in this CPCF (i.e., availability of measure specifications, importance of the measure, evidence for the focus of the measure, scientific soundness of the measure, identification of disparities, feasibility, levels of aggregation, understandability, health information technology).

This is a feasible, reliable and valid measure that also has limitations. Identifiable asthma is established using analysis of administrative data that have been found to be valid and reliable for identifying asthma, if imperfect.

Many ED visits that lead to hospitalization are coded as hospitalizations only in administrative data. Thus we review sampled asthma hospitalizations to look for associated ED visits to assess eligibility for the measure. This enhances validity at the expense of efficiency.

We identify documentation of many of the factors that satisfy the explicit appropriateness criteria by review (audit) of the medical record. Chart review requires training of abstractors to establish both reliability and validity. Our explicit criteria were developed using an adaptation of the RAND/UCLA Appropriateness Method (RUAM). The RUAM is reliable and valid, but subject to limitations. Our selection of a diverse and multidisciplinary expert panel enhances the validity of our findings.

Our measure of appropriate use of the ED could benefit from the incorporation of patient centered data to affirmatively explore some of the criteria that represent patient history, as well as to allow us to include an historical aspect that was endorsed by the panel but excluded from our specifications – a previous episode by the child that began similarly and rapidly declined. Hence instead of using the term inappropriate in contradistinction to appropriate visits, we use the term questionable or phrase “of questionable appropriateness.”

Documentation in the medical record can vary from site to site, but the items we incorporate into this measure are important and should be a part of the clinical documentation.

Interpretation of this measure should be restricted to assessing whether or not the level of care available at an ED was appropriate for the patient, given their specific clinical presentation. While it may help to distinguish between whether a presenting child is significantly ill with an asthma exacerbation or not, it does not specifically reflect upon the prior quality of care for any individual patient. At a population level, higher rates of appropriate visits may suggest more failures in clinical asthma management, while lower rates of appropriate use may suggest more concerns regarding the delivery of more appropriate levels of care (such as acute office visits) for children who may require timely clinical services for their asthma management.

SECTION XIII.
SUMMARY STATEMENT

Provide a summary rationale for why the measure should be selected for use, taking into account a balance among desirable attributes and limitations of the measure. Highlight specific advantages that this measure has over alternative measures on the same topic that were considered by the measure developer or specific advantages that this measure has over existing measures. If there is any information about this measure that is important for the review process but has not been addressed above, include it here.

Asthma is often termed the most common chronic diseases in children, with a high prevalence in Medicaid. Asthma visits to the emergency department (ED) are common and expensive. ED use and hospitalizations are considered to be potentially undesirable outcomes of asthma care. Identifying whether an asthma ED visit results because the child is sick and needs to be in the ED is valuable and actionable information.

This measure identifies whether or not the ED is an appropriate level of care for the clinical circumstance for which the child presents. It incorporates explicit appropriateness criteria that were developed by an expert panel using a well validated process in the context of CAPQuaM's stakeholder-engaged 360 degree method. We have previously validated our approach to case finding to identify ED visits in children with identifiable asthma.

For this measure we demonstrated that chart audit was capable of identifying the presence of a broad set of clinical indicators of appropriateness with high levels of reliability. We further demonstrated that our measure was able to identify differences in the proportion appropriate, such as those associated with age and race. For example, the overall level of appropriateness for children aged 2-5 was 54%, for children aged 6-1 was 44%, and for adolescents between 12 and 18, 48%

In summary, we went through a rigorous, transparent, and highly engaged measure development process to develop a feasible and efficient approach to produce reliable and valid measurement. The appropriate use measure estimates the degree to which ED visits for asthma represents the delivery of an appropriate level of care for children with identifiable asthma. The measures were successfully tested with the administrative component demonstrated, using Medicaid data and the chart audit in a single site chart audit of more than 1150 charts. The process, measures, and findings demonstrate the potential for our measures to enhance both accountability and improvement activities.

SECTION XIV.
IDENTIFYING INFORMATION FOR THE MEASURE SUBMITTER

Complete information about the person submitting the material, including the following:

a. Name: Lawrence Kleinman

b. Title: Director, Mount Sinai CAPQuaM

c. Organization: Icahn School of Medicine at Mount Sinai

d. Mailing Address: One Gustave L. Levy Place, Box 1077, New York, NY 10029

e. Telephone: 212-659-9556

f. Email: lawrence.kleinman@mssm.edu

g. Signed written statement guaranteeing that all aspects of the measure will be publicly available, as defined in the Public Disclosure Requirements.

Public Disclosure Requirements

Each submission must include a written statement agreeing that, should U.S. Department of Health and Human Services accept the measure for the 2014 and/or 2015 Improved Core Measure Sets, full measure specifications for the accepted measure will be subject to public disclosure (e.g., on the Agency for Healthcare Research and Quality [AHRQ] and/or Centers for Medicare & Medicaid Services [CMS] websites), except that potential measure users will not be permitted to use the measure for commercial use. In addition, AHRQ expects that measures and full measure specifications will be made reasonably available to all interested parties. “Full measure specifications” is defined as all information that any potential measure implementer will need to use and analyze the measure, including use and analysis within an electronic health record or other health information technology. As used herein, “commercial use” refers to any sale, license or distribution of a measure for commercial gain, or incorporation of a measure into any product or service that is sold, licensed or distributed for commercial gain, even if there is no actual charge for inclusion of the measure. This statement must be signed by an individual authorized to act for any holder of copyright on each submitted measure or instrument. The authority of the signatory to provide such authorization should be described in the letter (Section XIV: Identifying Information for the Measure Submitter).

Section XV.
Glossary of Terms

TERM #	TERM	DEFINITION	SOURCES
1.	DENOMINATOR	The number or population representing the total universe in which an event might happen: the number at risk used to calculate a rate, proportion, or percentage.	Cohn, 2001
2.	MEDICAL GROUP	A medical group is a self-defined "parent" provider organization which may exist within a broader network structure and is generally comprised of multiple practice sites, but can represent a single, large multi-specialty practice site. - They often have integrated administrative systems and procedures. - Some represent hospital affiliated provider organizations.	PQMP Result Aggregation Workgroup, 2012
3.	NETWORK	A network is an overarching affiliation of medical groups and/or practice sites with an integrated approach to quality improvement that health plans regard as a contracting entity for these provider organizations. - Most represent a collection of ambulatory practice sites whose integrated systems and procedures support clinical and administrative functions (e.g. scheduling, treating patients, ordering services, prescribing, keeping medical records and follow-up). - Some embody a collection of hospital affiliated providers.	PQMP Result Aggregation Workgroup, 2012
4.	NUMERATOR	A subset of those in the denominator who have experienced the event of interest (e.g., death, morbidity, screening) used to calculate a rate, proportion, or percentage.	RTI
5.	OUTCOME	A particular state of health, often defined for purposes of quality measurement as a result of the performance (or nonperformance) of functions or processes of care.	Adapted from CMS
6.	OUTCOME MEASURE	Measure that indicates the results of the performance (or nonperformance) of functions or processes. A measure that focuses on achieving a particular state of health.	CMS
7.	PROCESS MEASURE	Measure that focuses on a health care process that leads to a certain outcome. For a process measure to be valid, a scientific basis exists for believing that the process, when executed well, will increase the probability of achieving a desired outcome.	Adapted from CMS
8.	PRACTICE SITE	A practice site is one or a group of providers who practice together at a single location (i.e. same mailing address down to the Suite # level). - The single location is the site where care is provided during specific periods of time. - The same systems and procedures support clinical and administrative functions (e.g. scheduling, treating patients, ordering services, prescribing, keeping medical records and follow-up). - Medical records for all patients treated at the practice site are available to and shared by all providers, as appropriate.	Adapted from National Committee on Quality Assurance's practice site methodology
9.	PROCESS (of care)	Process of care denotes what is actually done to the patient in the giving and receiving of care. As examples: the provider could immunize the patient against a communicable disease; the provider could prescribe a medication for the patient; the provider could screen an asymptomatic patient for developmental disorders.	Adapted from IOM, 2006, Appendix E

TERM #	TERM	DEFINITION	SOURCES
10.	PROVIDER	Provider is any individual, organization, facility or group that delivers direct health care to children; depending on the measurement context, this may be a hospital, medical group, or individual clinician.	PQMP Result Aggregation Workgroup, 2012
11.	QUALITY (in health care)	Health care quality has been defined in several ways. In 1990, the Institute of Medicine (IOM) defined quality as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge (IOM, 1990). Eisenberg defined quality as the right care for the right person at the right time in the right way. In 2001, the IOM defined quality as having six aims: Safety, Timeliness, Effectiveness, Equity, Efficiency, and Patient-Centeredness. The Affordable Care Act defines quality of care as a measure of performance on IOM's six aims for health care. CHIPRA defines a clinical quality measure as "a measurement of clinical care that is capable of being examined through the collection and analysis of relevant information, that is developed in order to assess one or more aspects of pediatric health care quality in various institutional and ambulatory health care settings, including the structure of the clinical care system, the process of care, the outcome of care, or patient experiences in care."	IOM, 2001; IOM, 1990; Eisenberg, 1997; CHIPRA, 2009; Patient Protection and Affordable Care Act, 2010
12.	QUALITY MEASURE	A quality measure is in effect a rule (or the result of a rule) that assigns numeric values to a specific quality indicator. Quality measures generally consist of a descriptive statement or indicator, a list of data elements necessary to construct and/or report the measure, detailed specifications that direct how the data elements are to be collected (including the source of data), the population on whom the measure is constructed, the timing of data collection and reporting, the analytic models used to construct the measure, and the format in which the results will be presented.	Adapted from IOM, 2006, Appendix E; NQMC Glossary
13.	RELIABILITY	Measure reliability: The results of the measure are reproducible a high proportion of the time when assessed in the same population (e.g., the measure has high inter-rater reliability, no calculation errors). **Internal consistency reliability** (http://en.wikipedia.org/wiki/Internal_consistency) assesses the consistency of results across items within a test, where "test" refers to a series of questions, ratings, or other items designed to determine knowledge, ability, or health status. **Inter-rater reliability** (http://en.wikipedia.org/wiki/Inter-rater_reliability) is a measure of the variation in measurements when taken by different individuals but with the same method or instruments. **Test-retest** (http://en.wikipedia.org/wiki/Test-retest_reliability) is a statistical method used to determine a test's **reliability** (http://en.wikipedia.org/wiki/Reliability_(statistics). The test is performed twice; in the case of a questionnaire, this would mean giving a group of participants the same questionnaire on two different occasions. If the **correlation** (http://en.wikipedia.org/wiki/Correlation) between separate administrations of the test is high (~.7 or higher), then it has good test-retest reliability. It is important to consider the time interval between testing and retesting and the nature of the measurement. Quality measures optimally would show improvement in scores over time.	CMS; Wikipedia based on The Standards for Educational and Psychological Testing, 1999***; The Free Dictionary by Farlex

TERM #	TERM	DEFINITION	SOURCES
14.	STRUCTURE	Structure refers traditionally to the attributes of settings in which providers deliver health care, including material resources (e.g., electronic health records), human resources (e.g., staff expertise), and organizational structure (adapted from IOM, Performance Measurement, 2006; Appendix E). Some have suggested that structural attributes should include organizational characteristics such as leadership and culture (Kunkel, 2007) and system attributes beyond individual health care delivery settings.	Adapted from IOM, 2006, Appendix E
15.	STRUCTURAL MEASURE	Measures of structure assess the capacity of health care professionals and organizations to provide safe, timely, effective, equitable, efficient and patient-centered processes of care and positive health outcomes.	Adapted from AHRQ
16.	STRUCTURE-PROCESS-OUTCOMES MODEL	As identified by Donabedian (1988), the classic paradigm for assessing quality of care based on a three-component approach. Donabedian's model proposes that each component has a direct influence on the next (Donabedian, 1980): Structure influences Process, which in turn influences Outcomes.	IOM, 2006, Appendix E
17.	VALIDITY	Measure accurately represents the concept being evaluated and achieves the purpose for which it is intended (to measure quality). In **science** (http://en.wikipedia.org/wiki/Science) and **statistics** (http://en.wikipedia.org/wiki/Statistics), validity has no single, agreed-upon definition but generally refers to the extent to which a concept, conclusion, or measurement is well founded and corresponds accurately to the real world. The word "valid" is derived from the Latin *validus*, meaning strong. **Concurrent validity** (http://en.wikipedia.org/wiki/Concurrent_validity) refers to the degree to which the measure correlates with other measures of the same construct that are measured at the same time. Using a testing example, a test administered to current employees and then correlated with their scores on current performance reviews would have good concurrent validity if those who scored well on the test also did well on performance reviews. *Construct validity* is the extent to which a measure measures the concept or construct that it is intended to measure. For example, a measure that measures the quality of diabetes care by whether a provider conducted an HbA1c test on a patient with diabetes has relatively good construct validity because high HbA1c levels are associated with diabetes crises. *Content validity*. In **psychometrics** (http://en.wikipedia.org/wiki/Psychometrics), content validity refers to the extent to which a measure represents all facets of a given **construct** (http://en.wikipedia.org/wiki/Social_construct). For example, a depression scale may lack content validity if it only assesses the affective dimension of depression but fails to take into account the behavioral dimension. Using the diabetes care example, a combination of three different measures (HbA1c testing, foot examinations, and eye examinations) would have better content validity than a single measure of HbA1c testing.	CMS, Wikipedia, based on The Standards for Educational and Psychological Testing, 1999 ***

TERM #	TERM	DEFINITION	SOURCES
17. (cont.)	VALIDITY (cont.)	**Criterion validity** (http://en.wikipedia.org/wiki/Criterion_validity) involves the correlation between a measure and a criterion variable (or variables) taken as representative of the construct. In other words, it compares the test with other measures or outcomes (the criteria) already held to be valid. For example, IQ tests are often validated against measures of academic performance (the criterion). If the test data and criterion data are collected at the same time, this is referred to as *concurrent validity* evidence. If the test data are collected first in order to predict criterion data collected at a later point in time, then this is referred to as *predictive validity* evidence. *Face validity* is the validity of a measure at face value. Generally face validity means that the measure "looks like" it will work, as opposed to "has been shown to work." **Predictive validity** (http://en.wikipedia.org/wiki/Predictive_validity) refers to the degree to which the measure can predict (or correlate with) other measures of the same construct that are measured at some time in the future. In job selection, for example, this would mean that tests are administered to applicants, all applicants are hired, their performance is reviewed at a later time, and then their scores on the two measures are correlated. If there is a strong correlation between test scores and future performance, the test would be said to have good predictive validity. *Measures should be assessed against all relevant criteria at all intended levels of aggregation.*	continued

***A revised version is expected after 2012.

SECTION XVI.
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August 6, 2014

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Measure: Appropriateness of Emergency Department Visits for Children and Adolescents with Identifiable Asthma

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