Pediatric Medical Complexity Algorithm

Section 1. Basic Measure Information

1.A. Measure Name

Pediatric Medical Complexity Algorithm

1.B. Measure Number

0141

1.C. Measure Description

Please provide a non-technical description of the measure that conveys what it measures to a broad audience.

This measure represents a new method to stratify children by medical complexity.

1.D. Measure Owner

Center of Excellence on Quality of Care Measures for Children with Complex Needs (COE4CCN)

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

Not applicable.

1.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':

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.**

   Not applicable.

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.**

   Not applicable.

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.**

   Not applicable.

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.**

   Not applicable.

1.G. Numerator Statement

COE4CCN developed consensus definitions for three levels of medical complexity: children with complex chronic disease (C-CD), children with non-complex chronic disease (NC-CD), and children without chronic disease (CD). See Table 1 in the Supporting Documents for further description of these three populations.

1.H. Numerator Exclusions

Not applicable.

1.I. Denominator Statement

The Pediatric Medical Complexity Algorithm (PMCA) was developed and tested in children 0 to18 years of age insured by Washington State Medicaid (WA-Medicaid) and seen at Seattle Children's Hospital (SCH) for more than one emergency department (ED) visit and/or inpatient stay in 2010. It can therefore be applied to large datasets representing hospital and health plan utilization by children.

1.J. Denominator Exclusions

Not applicable.

1.K. Data Sources

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

Administrative data (e.g., claims data).

If other, please list all other data sources in the field below.

Not applicable.

Section 2: Detailed Measure Specifications

Provide sufficient detail to describe how a measure would be calculated from the recommended data sources, uploading a separate document (+ Upload attachment) or a link to a URL. 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. 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.

An SAS program with the relevant code is also available. Specifications on how to apply the code are provided in the Supporting Documents (see Section 2, Technical Specifications).

Section 3. 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).

3.A. Evidence for General Importance of the Measure

Provide evidence for all applicable aspects of general importance:

- **Addresses a known or suspected quality gap and/or disparity in quality (e.g., addresses a socioeconomic disparity, a racial/ethnic disparity, a disparity for Children with Special Health Care Needs (CSHCN), a disparity for limited English proficient (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).**

In March 2011, the Centers for Medicare & Medicaid Services (CMS) and the Agency for Healthcare Research and Quality (AHRQ) partnered to fund seven Centers of Excellence (COEs) that constitute the Pediatric Quality Measures Program (PQMP) mandated by the 2009 Child Health Insurance Program Reauthorization Act (Dougherty, Schiff, Mangione-Smith, 2011). The charge to the PQMP was to develop new quality of care measures and/or enhance existing measures for children's health care across the age spectrum (Mangione-smith, Schiff, Dougherty, 2011; Zima, Murphy, Scholle, et al., 2013). The Center of Excellence on Quality of Care Measures for Children with Complex Needs (COE4CCN) was charged with identifying and/or developing a valid methodology to assess disparities in care by level of medical complexity for children with special health care needs.

3.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).**
- **Any other specific relevance to Medicaid/CHIP (please specify).**

PMCA is a new, publicly available algorithm that identifies children with complex chronic disease (who have accessed tertiary hospital care) with good sensitivity and good to excellent specificity when applied to either hospital discharge or Medicaid claims data. As health care reform is implemented, use of PMCA will be critical to target resources and services such as care coordination to children with the most needs.

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

Describe, if known, how this measure complements or improves on an existing measure in this topic area for the child or adult population, or if it is intended to fill a specific gap in an existing measure category or topic. For example, the proposed measure may enhance an existing measure in the initial core set, it may lower the age range for an existing adult-focused measure, or it may fill a gap in measurement (e.g., for asthma care quality, inpatient care measures).

This is the first algorithm to be validated in a Medicaid population of children, and it adds to existing algorithms available for population stratification because it is publicly available and relatively straightforward to implement.

Section 4. 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.

Does the measure address this category?

a. **Care Setting – ambulatory:** Yes.
b. **Care Setting – inpatient:** Yes.
c. **Care Setting – other – please specify:** No.
d. **Service – preventive health, including services to promote healthy birth:** No.
e. **Service – care for acute conditions:** No.
f. **Service – care for children with acute conditions:** Yes.
g. **Service – other (please specify):** No.
h. **Measure Topic – duration of enrollment:** No.
i. **Measure Topic – clinical quality:** No.
j. **Measure Topic – patient safety:** No.
k. **Measure Topic – family experience with care:** No.
l. **Measure Topic – care in the most integrated setting:** No.
m. **Measure Topic other (please specify):** No.
n. **Population – pregnant women:** No.
o. **Population – neonates (28 days after birth) (specify age range):** Yes; all.
p. **Population – infants (29 days to 1 year) (specify age range):** Yes; all.
q. **Population – pre-school age children (1 year through 5 years) (specify age range):** Yes; all.
r. **Population – school-aged children (6 years through 10 years) (specify age range):** Yes; all.
s. **Population – adolescents (11 years through 20 years) (specify age range):** Yes; all.
t. **Population – other (specify age range):** No.
u. **Other category (please specify):** Not applicable.

Section 5. 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.

5.A. Research Evidence

Research evidence should include a brief description of the evidence base for valid relationship(s) among the structure, process, and/or outcome of health care that is the focus of the measure. For example, evidence exists for the relationship between immunizing a child or adolescent (process of care) and improved outcomes for the child and the public. If sufficient evidence existed for the use of immunization registries in practice or at the State

level and the provision of immunizations to children and adolescents, such evidence would support the focus of a measure on immunization registries (a structural measure).

Describe the nature of the evidence, including study design, and provide relevant citations for statements made. Evidence may include rigorous systematic reviews of research literature and high-quality research studies.

Not applicable.

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

Provide documentation of the clinical or other rationale for the focus of this measure, including citations as appropriate and available.

As the Affordable Care Act is implemented, Medicaid and the health care system increasingly need strategies to allocate resources. Children with complex chronic disease are most likely to benefit from care coordination and other resources, and accurate identification of this group is critical (Cohen, Kuo, Agrawal, et al., 2011). These children may suffer the worst quality of care for many of the measures under development by the PQMP. Use of PMCA will allow us to address the legislative mandate to assess disparities by special health care need status and further test the hypothesis that children with complex chronic disease experience poorer quality of care than either children with noncomplex chronic disease or healthy children.

Section 6. 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.

6.A. Reliability

Reliability of the measure is the extent to which the measure results are reproducible when conditions remain the same. The method for establishing the reliability 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., the Kappa statistic). Provide appropriate citations to justify methods.

We have tested the algorithm using Washington and Minnesota Medicaid data and have found very similar percentages of children falling into each category—C-CD, NC-CD and Non-CD—across two State Medicaid agencies. Given similar data sets, PMCA provides similar information about population stratification.

6.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., R2 for concurrent validity).

Identifying a Gold Standard Population: Classifying Children by Medical Complexity Using Medical Record Review

Children 0 to18 years of age insured by Washington State Medicaid (WA-Medicaid) and seen at Seattle Children's Hospital (SCH) for more than one emergency department (ED) visit and/or inpatient stay in 2010 were potentially eligible for the study. In order to over-sample children in the complex chronic disease group, these children were categorized into one of nine mutually exclusive risk groups using 3M Clinical Risk Group (CRG) software applied to 4 years (2007-2010) of SCH ED, inpatient, and day surgery administrative data. After CRG categorization, a sample of 1,000 children was randomly selected with oversampling (n=500) for children with lifelong chronic conditions (CRG groups 5b, 6, 7, 8, and 9).

A trained nurse researcher blinded to CRG categorization made assignments into one of three levels of medical complexity through review of all available SCH electronic medical records. When level assignment was unclear, cases were reviewed by a panel of physicians also blinded to CRG categorization, and assignments were made by consensus. Among the sample of 1,000 randomly selected children, medical records were reviewed until the target gold standard population of 700 children was assembled. The target population included 350 children with complex chronic disease, 100 with non-complex chronic disease, and 250 without chronic disease; these sample sizes were determined *a priori* to allow for stable estimates of PMCA's sensitivity and specificity for correctly classifying patients into the three levels of complexity.

Almost all (699/700) of the gold standard population children were successfully matched in the WA-Medicaid claims database. Twenty individuals more than age 18 years of age were excluded because they were not eligible for WA-Medicaid for substantial portions of the study period and had incomplete claims data. One child having only secondary Medicaid coverage was also excluded. The final WA-Medicaid study sample numbered 678, while all 700 children were included in the SCH study sample.

Algorithm Evaluation

Three versions of the PMCA SAS code were developed to characterize the timing and frequency of coded conditions from administrative data – the least, more, and most conservative versions as described in Table 2 (see Supporting Documents). Children in the sample had up to 3 years of data available for analysis in both the SCH and WA-Medicaid claims databases, 1 year before and 1 year after the year of their hospitalization or ED visit (i.e., January 1, 2009 – December 31, 2011). All children were included regardless of how much data they had available to contribute to the analysis. All children in both the SCH and WA-Medicaid samples had at least one claim in

2010 which represented the ED and/or inpatient encounter making them eligible for gold standard population selection.

We determined PMCA's sensitivity and specificity for correctly classifying children into the three levels of complexity using SCH discharge and WA-Medicaid claims data. SCH data included administrative claims from inpatient, ED, and day surgery encounters. WA-Medicaid data included all inpatient and outpatient claims provided to the state. We also evaluated the performance of three different versions of the PMCA SAS code described. Results are provided in Table 3 (see Supporting Documents).

Section 7. 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.

7.A. Race/Ethnicity

Since it is applied to large datasets containing health care utilization data, we expect PMCA to perform the same across races/ethnicities, provided these groups receive health care.

7.B. Special Health Care Needs

Quality measures developed by the Pediatric Quality Measures Program are required to assess disparities in performance by special health care need status. PMCA is a methodology developed to identify children by level of medical complexity in administrative data.

7.C. Socioeconomic Status

Since it is applied to large datasets containing health care utilization data, we expect PMCA to perform the same across socioeconomic groups, provided these groups receive health care.

7.D. Rurality/Urbanicity

Since it is applied to large datasets containing health care utilization data, we expect PMCA to perform the same across geographic areas, provided groups from these areas receive health care.

7.E. Limited English Proficiency (LEP) Populations

Since it is applied to large datasets containing health care utilization data, we expect PMCA to perform the same across LEP populations, provided these groups receive health care.

Section 8. Feasibility

Feasibility is the extent to which the data required for the measure are readily available, retrievable without undue burden, and can be implemented for performance measurement. Using the following sections, explain the methods used to determine the feasibility of implementing the measure.

8.A. Data Availability

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

We determined PMCA's sensitivity and specificity for correctly classifying children into the three levels of complexity using SCH discharge and WA-Medicaid claims data based on ICD-9-CM diagnosis codes. SCH data included administrative claims from inpatient, ED, and day surgery encounters. WA-Medicaid data included all inpatient and outpatient claims provided to the State. We recommend applying PMCA to up to 3 years of data, although the algorithm can be run with fewer years of data .

Children in the sample we tested had up to 3 years of data available for analysis in both the SCH and WA-Medicaid claims databases, 1 year before and 1 year after the year of their hospitalization or ED visit (i.e., January 1, 2009 – December 31, 2011). All children were included regardless of how much data they had available to contribute to the analysis. All children in both the SCH and WA Medicaid samples had at least one claim in 2010 which represented the ED and/or inpatient encounter making them eligible for gold standard population selection.

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?

Not applicable. We are working to create an ICD-10 compatible version of PMCA to handle future administrative data; we expect this version to be available in late summer 2017.

8.B. Lessons from Use of the Measure

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.

PMCA has been distributed and has been used in several contexts, including but not limited to:

1. Children's hospitals wanting to identify complex children for programmatic purposes (Vanderbilt, University of Wisconsin, Duke University, Nationwide Children's Hospital, Cincinnati Children's Hospital Medical Center).

2. Health plans wanting to identify medically complex children (Amerihealth, Texas Children's Health Plan, Geisinger, Children's Health Alliance in Oregon).

3. Medicaid plans wanting to identify medically complex children (Children's Health Insurance Program [CHIP] in Alaska, Oregon, and West Virginia; Mathematica claims-based Children with Special Health Care Needs [CSHCN] in CHIPRA quality demonstration project).

4. Quality measure developers wanting to identify complex children for measure development (National Committee for Quality Assurance [NCQA], Scholle group at New York University, Schuster group in Boston).

5. Researchers (the Child and Adolescent Health Measurement Initiative [CAHMI], University of California at San Francisco, Stanford, Children's Hospital Association).

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?

PMCA is applied to ICD-9 diagnosis codes in administrative data to make three assignments of levels of medical complexity to pediatric populations.

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

A handful of diagnosis codes have been identified as problematic. We also completed a reverse validation study that informed modifications to PMCA. Therefore, minor changes were made to PMCA version 2.0. The associated SAS code is posted to the Mangione-Smith Web site, and the associated paper is slated for publication in the July 2017 issue of Hospital Pediatrics.

We also have a reverse validation study underway that we hope will further inform modifications to PMCA.

Stanford's group reported "We'd like to move forward with publication and/or promoting its use in health services research and programmatic innovation. (Of note, though unscientific, our analysis found strong validity in our largest subgroup: all Title V enrollees in Los Angeles County!)."

In work done with the Children's Hospital Association, we have also demonstrated an increasing proportion of complex children cared for at children's hospitals in recent years.

Cincinnati Children's Medical Center's group reported:

"We have found it most useful in these settings:

1. Stratification of large populations with the same diagnosis but varying acuity (e.g., epilepsy, cardiomyopathy).
2. Stratification of primary care populations to identify children with special needs for registry development and care planning.
3. As a triage tool for larger populations of children with chronic conditions—so care management can be addressed initially for those most complex.

4. To identify children with co-morbidities who are listed in more than one disease-specific registry, or whose care is shared across divisions."

Section 9. 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 the 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.

Level of aggregation (Unit) for reporting on the quality of care for children covered by Medicaid/ CHIP†:

State level* Can compare States

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
Yes.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Other geographic level: Can compare other geographic regions (e.g., MSA, HRR)

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Medicaid or CHIP Payment model: Can compare payment models (e.g., managed care, primary care case management, FFS, and other models)

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
Yes.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
Yes.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**

No known unintended consequences.

Health plan*: Can compare quality of care among health plans.

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
Yes.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
Yes.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Provider Level
Individual practitioner: Can compare individual health care professionals

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
No.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Provider Level
Hospital: Can compare hospitals

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
Yes.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
Yes.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Provider Level
Practice, group, or facility:** Can compare: (i) practice sites; (ii) medical or other professional groups; or (iii) integrated or other delivery networks

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

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?**
Not applicable.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
No known unintended consequences.

Section 10. Understandability

CHIPRA states that the core set should allow purchasers, families, and health care providers to understand the quality of care for children. Please describe the usefulness of this measure toward achieving this goal. Describe efforts to assess the understandability of this measure (e.g., focus group testing with stakeholders).

The Pediatric Medical Complexity Algorithm (PMCA) is a new, publicly available algorithm that identifies the small proportion of children with complex chronic disease in Medicaid claims and hospital discharge data with good sensitivity and good to excellent specificity.

Section 11. 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 measure calculation.

11.A. Health IT Enhancement

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

Cincinnati Children's Medical Center used PMCA on data from their EHR (Epic).

11.B. Health IT Testing

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

Yes.

If so, in what health IT system was it tested and what were the results of testing?

Cincinnati Children's Medical Center used PMCA on data from their EHR (Epic).

11.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.

PMCA relies on ICD-9 diagnosis codes applied at billable outpatient and inpatient services.

11.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 healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_ifr/1195)?

No.

If yes, please describe.

Not applicable.

11.E. Health IT Calculation

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

Not applicable.

11.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 characteristics on the measure?

Not applicable.

Section 12. 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).

Because this study targeted identification of children with complex chronic disease (C-CD), our gold standard population (see Table 4 in the Supporting Documents) was drawn from a tertiary care hospital and was not representative of Washington State Medicaid-insured children. Further validation work in other populations of children, including health systems where most children primarily access outpatient care, is needed. We also anticipate the need for further changes to PMCA to ensure compatibility with future widespread adoption of ICD-10-CM codes.

Section 13. 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.

To enable assessment of disparities in care by special health care need status, we developed a novel algorithm by modifying an existing ICD-9-CM–based algorithm (Chronic Disability and Payment System) to align with the COE4CCN consensus definitions for three levels of medical complexity. PMCA has good sensitivity for correctly categorizing children with C-CD, excellent sensitivity for correctly categorizing children without CD, but poor sensitivity for correctly categorizing children with NC-CD. For optimal identification of these three groups of children using Medicaid claims data, we recommend using the more conservative version of the PMCA code and up to 3 years of claims data when available. For hospital discharge data (limited to emergency department, inpatient, and day surgery claims), we recommend using the least conservative version of the PMCA code and up to 3 years of data when available.

Despite its limitations and potential future revisions, PMCA is a new, publicly available algorithm that identifies children with C-CD (who have accessed tertiary hospital care) with good sensitivity and good to excellent specificity when applied to either hospital discharge or Medicaid claims data. As health care reform is implemented, use of PMCA will be critical to target resources and services such as care coordination to children with the most needs.

References

Cohen E, Kuo DZ, Agrawal R, et al. Children with medical complexity: an emerging population for clinical and research initiatives. Pediatrics 2011; 127(3):529-38.

Dougherty D, Schiff J, Mangione-Smith R. The Children's Health Insurance Program Reauthorization Act quality measures initiatives: moving forward to improve measurement, care, and child and adolescent outcomes. Acad Pediatr 2011; 11(3 Suppl):S1-10.

Mangione-Smith R, Schiff J, Dougherty D. Identifying children's health care quality measures for Medicaid and CHIP: an evidence-informed, publicly transparent expert process. Acad Pediatr 2011; 11(3 Suppl):S11-21.

Zima BT, Murphy JM, Scholle SH, et al. National quality measures for child mental health care: background, progress, and next steps. Pediatrics 2013; 131(Suppl 1):S38-49.

Section 14: Identifying Information for the Measure Submitter

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

Public Disclosure Requirements

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