Linkage Between Dental Prevention and Dental Treatment Measures

Section 1. Basic Measure Information

1.A. Measure Name

Linkage Between Dental Prevention and Dental Treatment Measures

1.B. Measure Number

0164

1.C. Measure Description

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

The Pediatric Measurement Center of Excellence (PMCoE) was assigned the dental measures project by the Agency for Healthcare Research and Quality (AHRQ), and the American Academy of Pediatrics (AAP) was then tasked to provide leadership in this effort. The goal of the project was to examine the potential relationship between dental prevention and dental treatment by linking the two dental measures (measure 13 - prevention and measure 17 - treatment) in the CHIPRA Initial Core Set. Surveying this relationship across a time period will allow for historical comparisons and, in the future, to ideally see a trend of preventive oral health services increasing and dental treatment services decreasing, indicating a reduction in caries disease burden on children and improved oral health care in the Medicaid program.

Our approach, described in the technical specifications (see Supporting Documents, Attachment 2.1), identifies the percentage of individuals ages 1 to 18 that are enrolled in Medicaid or CHIP Medicaid Expansion programs, are eligible for Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) services, and received either preventive dental services or dental treatment services. Due to data limitations, there are some instances where we did not apply all of the criteria within the specifications for our approach. This was due to data limitations, and we have noted these instances in our description of measure testing, where applicable.

After the percentage of individuals was calculated, relationships were then analyzed between dental prevention and treatment services. Separately, an ecological study was conducted to examine the relationship between preventive medical care (well-child visits) and a later dental visit (prevention or treatment).

1.D. Measure Owner

Measures 13 and 17 are part of the CHIPRA Initial Core Set of Children's Health Care Quality Measures (Centers for Medicare & Medicaid Services [CMS]).

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.**

   Measures 13 and 17 are part of the CHIPRA Initial Core Set of Children's Health Care Quality Measures (CMS).

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

Measure 13: The unduplicated number of children receiving at least one preventive dental service; refer to Attachment 2.1, p.3 (see Supporting Documents).

Numerators for each of the following: Number of children with at least one well-child exam; Number of children with at least one dental prophylaxis; Number of children with at least one fluoride treatment; Number of children with sealants; Number of children with dental

prophylaxis with fluoride treatment on the same date of service; Number of children with dental prophylaxis and sealant on the same date of service.

Dental age groups in years: 1, 2, 3-4, 5, 6-8, 9, 10-11, 12-18

As a special component of the analysis, the unduplicated number of children receiving fluoride services performed by or under the supervision of a medical (Provider type: 200-Medical Doctor, 206-Mutispecialty Physician Group, 240-Family Practice, 360-Preventive Medicine) or dental provider (100-MD and DDS, 105-Dental Specialist, 805-Dental Technician).

Measure 17: The unduplicated number of individuals receiving at least one dental treatment service; refer to Attachment 2.1, pp.6-7 (see Supporting Documents).

Dental age groups in years: 1, 2, 3-4, 5, 6-8, 9, 10-11, 12-18

Numerators defined for each of the following treatment severity groups: Restorative Care (at least one surface); Restorative Care (number of treated surfaces); Extractions; Sealants; Endodontics.

1.H. Numerator Exclusions

Not applicable.

1.I. Denominator Statement

The total unduplicated number of individuals ages 1 to 18 that have been continuously enrolled in Medicaid or a CHIP Medicaid Expansion program for at least 12 months and are eligible to receive EPSDT services. (Note: we were not able to apply eligibility for EPSDT services to our feasibility testing using the MarketScan Medicaid database. Our testing population was Medicaid enrollees).

Services may be provided under both fee-for-service and managed care arrangements and through any other private health plans that contract with the State.

1.J. Denominator Exclusions

Measure 13: Do not include in this count the following groups of individuals: Medically needy individuals ages 1 to 20 if you do not provide EPSDT services for the medically needy population; individuals eligible for Medicaid only under a §1115 waiver as part of an expanded population for which the full complement of EPSDT services is not available; undocumented aliens who are eligible only for emergency Medicaid services; and/or groups of individuals ages 1 to 20 who are eligible only for limited services as part of their Medicaid eligibility (for example, pregnancy-related services).

Measure 17: Exclude children that are not eligible to receive dental service through Medicaid or CHIP. Examples may include undocumented aliens that are eligible only for emergency

Medicaid services or those that are eligible only for limited services as part of their Medicaid/CHIP eligibility (e.g., pregnancy-related services).

Note: No exclusions were applied in feasibility testing for this measure. These criteria were not available in the MarketScan Medicaid database.

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.

Please refer to Attachment 2.1 (see Supporting Documents) for 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).**

Evidence has clearly and consistently shown that healthy teeth are an important part of children's overall health. The consequences of poor oral health in children are serious: (1) early childhood caries (cavities) is the number one chronic disease affecting young children; (2) early childhood caries are five times as common as asthma and seven times as common as hay fever; and (3) tooth pain keeps many children home from school or distracted from learning.

Prevention is a significant factor in keeping children's teeth healthy and should be utilized as much as possible to reduce health care costs and pain and suffering of vulnerable children. Necessary dental treatment should also be provided to children when needed, followed by regular preventive visits.

If Medicaid programs are able to use the proposed testing approach to better analyze the relationships between preventive and dental treatment services over a number of years, they may be able to create more impactful quality improvement initiatives to address the six domains of health care quality (safety, effectiveness, efficiency, equity, and patient-centered care). The studies cited below demonstrate the need to better track and evaluate these relationships for improved health outcomes and reduced costs to the Medicaid program.

"The lack of access to preventive dental care can result in high costs for complex restorative procedures, especially if the child requires hospital-based care. Such care can cost as much as $15,000 per admission, carries a slight but real risk of anesthetic death, and places big burdens on public resources and State Medicaid budgets" (Cantrell, 2009).

"Consequences of ECC [early childhood caries] include a higher risk of new carious lesions in both the primary and permanent dentitions, hospitalizations and emergency room visits, increased treatment costs, risk for delayed physical growth and development, loss of school days and increased days with restricted activity, diminished ability to learn, and diminished oral health-related quality of life" (American Academy of Pediatric Dentistry, 2011).

"The Pew Center on the States estimates that preventable dental conditions were the primary diagnosis in 830,590 visits to ERs nationwide in 2009—a 16 percent increase from 2006. For many low-income children, emergency rooms are the first and last resort because their families struggle to find a dentist who either practices in their area or accepts Medicaid patients" (Pew Center on the States, 2012).

"Health care providers who diagnose oral disease or trauma should either provide therapy or refer the patient to an appropriately trained individual for treatment. Immediate intervention is necessary to prevent further dental destruction, as well as more widespread health problems. Postponed treatment can result in exacerbated problems that may lead to the need for more extensive care. Early intervention could result in savings of health care dollars for individuals, community health care programs, and third party payers" (American Academy of Pediatric Dentistry, 2009).

"Because of the aggressive nature of ECC, areas of demineralization and hypoplasia can rapidly develop cavitation. If untreated, the disease process can rapidly involve the dental pulpal tissue leading to dental infection and possibly life-threatening fascial space involvement. Such infections may result in a medical emergency requiring hospitalization, antibiotics, and extraction of the offending tooth" (American Academy of Pediatric Dentistry, 2011).

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).**

Currently, there are only two population-based quality measures around dental care in the CHIPRA Initial Core Set, Measures 13 and 17 (see https://www.ahrq.gov/policymakers/chipra/overview/background/tables.html). As they stand, these measures are simply a percentage of children who have received preventive and dental treatment services by or under the supervision of a dentist. Although this information is important to Medicaid programs to determine the children enrolled who receive care, it doesn't provide information on the continuity of care, the completion of dental treatment plans, or the important relationship between prevention and treatment.

By using these two population-based measures and suggesting some enhancements (longer enrollment periods, expanded provider types, and age stratification), as well as a method to test the relationships (regression models), we will be able to assist Medicaid programs to improve how they measure these services and design quality improvement activities. If Medicaid programs regularly examine the relationship between Measure 13 and Measure 17 using our

enhanced specifications and testing methods, they may be able to identify trends in care that are ripe for intervention. "Medicaid programs are particularly interested in dental care because oral health problems, such as dental caries, are more prevalent and severe among children from low-income families" (McQuade, Dellapenna, Oh, et al., 2011).

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 approach describes a linkage of two existing measures in the CHIPRA Initial Core Set; these include Measure 13: Percentage of Eligibles That Received Preventive Dental Services, and Measure 17: Percentage of Eligibles That Received Dental Treatment Services, based on enhanced specifications. Through the enhancement described, the linked measures examine the percentage of individuals ages 1 to 18 that are enrolled in Medicaid or CHIP Medicaid Expansion programs, are eligible for EPSDT services, and that received both preventive dental services and dental treatment services. Relationships are then analyzed between prevention and treatment and, separately, fluoride treatment from a medical provider to a later dental visit.

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:** No.
   c. **Care Setting – other – please specify:** No.
   d. **Service – preventive health, including services to promote healthy birth:** Yes.
   e. **Service – care for acute conditions:** No.
   f. **Service – care for children with acute conditions:** No.
   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:** No.

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; ages 1-5 years.
r. **Population – school-aged children (6 years through 10 years) (specify age range):** Yes; ages 6-10 years.
s. **Population – adolescents (11 years through 20 years) (specify age range):** Yes; ages 11-18 years.
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.

Preventing dental caries before they start would significantly lessen the pain and discomfort that children experience and reduce the amount and severity of dental treatment needed. There are many preventive actions that can take place in the dental and medical office, as well as in the home, that can reduce the risk of caries, including anticipatory guidance and counseling, referral to a dental home, fluoride application (varnish), fluoride supplementation, tooth brushing with fluoridated toothpaste, drinking fluoridated water, and so on. What can be measured in the Medicaid program are the effects of the preventive services that take place in the medical and dental homes and whether these services do, in fact, lead to less severe and less frequent dental treatment. Although it is difficult to draw clear lines between prevention and treatment due to confounding factors, limited data sources, and other factors, we do believe that there is a relationship between dental prevention and treatment. The statements that follow and the studies

cited in this report support this statement and demonstrate the need for further exploration of the relationship between preventive oral health services and dental treatment.

"Preventive dental treatments by physicians, begun at a young age, are effective in reducing future dental caries treatments in young children" (Pahel, Rozier, Stearns, et al., 2011).

"Fluoride varnish applied at primary medical care visits can reduce decay rates by one-third, and lead to significant cost savings in restorative dental care and associated hospital costs. Coupled with parent and caregiver education, fluoride varnish is an important tool to improve children's health" (Marinho, Higgins, Logan, 2002).

"Even when poor and near-poor children have access to a dentist, they may not receive generally accepted recommended care such as dental sealants. Dental sealants prevent tooth decay, save money, and are an important preventive measure, complementing the use of fluorides" (Stanton, 2003).

In a recent United States Preventive Services Task Force (USPSTF) statement, the use of fluoride vanish and prescription fluoride supplements in the primary care setting for children up to the age of 5 were recommended as strong interventions to reduce the risk of caries with little to no risk to the child (USPSTF, 2014).

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.

While clinical practice guidelines serve as the foundation for the development of performance measures, there are not a plethora of guidelines that relate to dental prevention or treatment services for children, and this may contribute to the scarcity of dental measures. Because it was difficult to determine from available guidelines new measures to be explored, it was decided that this project would focus on the linkage between two existing measures from the CHIPRA Core set rather than the creation of additional measures. Also, a newly formed group called the Dental Quality Alliance was established at the American Dental Association around the same time as the PMCoE Dental Project began and since has developed a set of pediatric oral health measures that have been tested and are now available for implementation (American Dental Association, 2015).

Below is a list of national organizations that have developed guidelines or policy statements around dental prevention and treatment.

- American Academy of Pediatric Dentistry (numerous – see http://www.aapd.org/policies/).

- Canadian Dental Association (numerous – see https://www.cdaadc.ca/en/about/position_statements/).

- American Academy of Pediatric Dentistry (see periodicity schedule at http://www.aapd.org/media/Policies_Guidelines/G_Periodicity.pdf).

The following groups have not produced guidelines specifically related to dental treatment for children but have produced guidelines or recommendations related to prevention:

- American Academy of Pediatrics (policy statements available regarding the establishment of a dental home by age 1 and the role of the primary care provider in prevention).

- American Academy of Family Physicians; American Dental Association (There are no evidence-based dentistry (EBD) guidelines developed by ADA as they pertain to dental treatment in children. EBDs are available regarding fluoride intake and other preventive services for children).

- United States Preventive Services Task Force (updated recommendation available for primary care prevention in preschool age children, periodontal screening, and oral cancer screening) (Chou, Cantor, Zakher, 2013; USPSTF, 2014).

- Canadian Pediatric Association.

- Canadian Pediatric Dentistry Association.

- Academy of General Dentistry.

- Centers for Disease Control and Prevention (guideline available for infection control in dental settings) (CDC, 2016, 2003).

Clearly, there is much guidance for the clinician on the use of preventive oral health services in the medical and dental homes. Guidance pertaining to dental treatment is mainly directed by large dental associations and their policies. This study aimed to examine the relationship between dental prevention and treatment services in a large Medicaid population. The goal of this study was to further inform future oral health quality improvement initiatives put forth by individual Medicaid programs.

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.

Since the analysis uses two currently existing measures, we did not formally test the reliability of the individual measures. However, for the reliability of the analysis, we increased the continuous

coverage requirement from 3 months to 1 year in order to analyze the relationship between prevention and treatment services. Extending the coverage to 1 year allows for a more complete picture of the children's use of dental services, and although it does exclude some children, 70 percent of children ages 1-18 had continuous coverage for 2012.

A typical well-child exam may or may not include oral hygiene instruction and counseling, caries risk assessment, fluoride varnish, and dental referral for follow-up care. Fluoride treatment analysis was stratified to dental and medical provider types to help further delineate where patients receive these services. This was an ecological study that examined associations, not causation or correlation.

Due to an abundance of dental prevention and treatment Charge Description Master (CDM) codes that fall under Measures 13 and 17, the Expert Workgroup first utilized frequency testing to identify a smaller group of prevention and treatment codes that represented approximately 95 percent of those encountered. We then qualitatively grouped this revised data set into categories by similar service type or dental pathology being treated. For specific services, we either examined the number of visits (prophys and fluoride) or we looked at the total number of surface amalgams or resin. We also looked at specific combinations of preventive services (e.g., dental prophy with a fluoride treatment or dental prophy with sealant) received at the same visit.

Detailed results are included in Attachment 6.1, Table Results (see Supporting Documents). Variability by age is important to note in the table and below.

For preventive services:

- 42 percent of children had a visit where they received a dental prophy with fluoride or sealant (from any type of clinician), but there was a great deal of variability by age.

- Over 60 percent of children ages 4 to 10 received a dental prophy with fluoride or sealant, but 2- and 3-year olds were slightly less likely to receive these services (40 percent and 54 percent, respectively).

- 43 percent of children received a well-child exam, and younger children were much more likely to have a well-child exam.

For treatment services:

- 9 percent of children received a post one-surface resin-based composite, but very young children were much less likely to receive this procedure.

- Other treatments (crowns, protective restoration, core build up, and end therapy) were quite rare, and less than 3.7 percent of children had these procedures.

For the linked measures:

The overall association between the two types of services (prevention and treatment) was very strong, but we were not able to look at the order of services or causality, so we cannot state that one necessarily drives the other. However, we were able to ascertain that receiving one type of service (prevention or treatment) increases the likelihood (in general) of receiving other types of services. More detailed information regarding the testing of the linked measures can be found in the next section, Section 6.B, Validity.

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).

In order to evaluate the relationship between prevention (including well-child exams) and treatment, chi-square tests were run comparing all preventive services to all treatment services for specific age groups in years (ages 1, 2, 3-4, 5, 6-8, 9, 10-11, 12-18). We also ran multivariate regressions using receipt of the treatment service as the dependent variable and receipt of the prevention service, age group, and sex as independent variables.

Many of the treatment services are dichotomous variables, and we ran multivariate logistic regressions. Odds ratios and confidence intervals for the prevention services are available in Attachment 6.2, pp.1-2 (see Supporting Documents). For surface amalgams/resins and surface resin composites, we combined multiple categories to note if the subjects received any service in the specific category. Using surface amalgams as an example, the first dependent variable (labeled "One or More Surface Amalgams") equals 1 if the subjects received any surface amalgam or resin regardless of the number of surfaces treated, and the second variable (labeled "Two or More Surface Amalgams") equals 1 if they had two or more surfaces treated.

In order to measure intensity of treatment services received, we also generated an estimate of the total number of surfaces treated by amalgam or resin. We counted the number of treatments received, multiplied it by the number of surfaces treated, and then summed them for every child. In order to reduce the impact of outliers, we top-coded this variable to 10, so any child with more than 10 surfaces treated was changed to 10. The distribution of the number of surfaces treated can be found on p.3 of Attachment 6.2 (see Supporting Documents). Ninety-two percent of children had no surfaces treated, and 3.49 percent had one or two surfaces treated. For this variable, we ran linear regressions, available in Attachment 6.2, p.4 (see Supporting Documents), comparing surfaces treated to receipt of prevention services, controlling for age group and sex of the child.

For prevention services, we generated multiple versions and combinations of the measures in order to determine if receipt, intensity (measured by frequency), or source of treatment were also factors. The effects of dental prophys and fluoride treatments (by dental and medical providers) were analyzed in two ways. One simply measured whether or not the child received the service, and the other noted how many treatments were received. To evaluate the benefit of receiving preventive services at the same visit, we also looked at specific combinations (e.g., dental prophy with a fluoride treatment or dental prophy with sealant at the same visit).

Overall, children who receive prevention services are much more likely to receive treatment services. For the logistic regression results, the odds ratios reflect the relative odds of receiving the treatment service comparing children who did receive prevention to those who did not. For

one or more surface amalgams, the odds of having a surface treated for children who received dental prophy were 4.84 times as high as for children who did not receive a dental prophy. There are some exceptions; the receipt of well-child exams reduces the odds of core build up (OR=0.86 95 percent C.I. [0.81, 0.92]), complete pulpectomy (OR=0.96 [0.93, 0.98]), pulpal therapy (OR=0.69 [0.62, 0.76]), and end therapy (OR=0.91 [0.87, 0.94]). Receiving fluoride treatments from a medical provider reduces the odds of surface amalgams and crowns. For the linear regressions, the coefficients represent the difference in the number of surfaces treated, so for dental prophys, children with at least one prophy claim had 0.42 (p-value < 0.0001) more surfaces treated than children with no dental prophy claims. Similar to the logistic regression results, receiving fluoride from a medical provider reduced the number of surfaces treated, but the effect was small (coefficient=-0.01 p-value=0.04).

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

While we did not specifically consider race/ethnicity in this study, we know that there are disparities in this area as evidenced by the study quoted below.

"The prevalence of dental caries (treated or untreated tooth decay) in the primary dentition of U.S. children aged 2–4 years increased from 18.5 percent in 1988–1994 to 23.7 percent in 1999–2004. Among children aged 6–8 years, the prevalence of dental caries among non-Hispanic white children in that age group remained unchanged at about 49 percent; it increased among non-Hispanic black children from 49.4 percent to 56.1 percent and remained above 63 percent among Mexican American children" (Tomar, Reeves, 2010).

7.B. Special Health Care Needs

While we did not specifically consider special health care needs in this study, we know that there are disparities in this area. Children with special health care needs are disproportionately at risk for dental disease and often are unable to access care. Providing care to these children should be a measureable component of delivering quality dental treatment services.

"Children with special health care needs are three times more likely to have unmet dental needs" (National Maternal and Child Oral Health Resource Center, August 2011).

7.C. Socioeconomic Status

While we did not specifically consider socioeconomic status in this study, we know that there are disparities in this area.

"Children from low-income families face barriers to preventive dental care (PDC) and are disproportionately affected by dental caries. The Access to the Baby and Childhood Dentistry (ABCD) program of Washington State is targeted to Medicaid-insured children < 6 years of age to improve their access to PDC. This study describes a program that has successfully increased access to dental care for Medicaid insured children" (Lewis, Teeple, Robertson, et al., 2009).

7.D. Rurality/Urbanicity

Not available.

7.E. Limited English Proficiency (LEP) Populations

Not available.

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?

Since the analysis relies on existing measures, almost all data elements are readily available in claims databases. Clinician specialty is used to conduct parts of the analysis and may not be available in all databases, but it is not required. Recently, the number of administrative databases that include physician/clinician specialty has increased.

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.

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.

To our knowledge, the linkage of these two measures has not been used.

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?

To our knowledge, the linkage of these two measures has not been used.

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

To our knowledge, the linkage of these two measures has not been used.

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)**
No.

Data Sources: **Are data sources available to support reporting at this level?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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)**
No.

Data Sources: **Are data sources available to support reporting at this level?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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)**
No.

Data Sources: **Are data sources available to support reporting at this level?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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

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?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

Provider Level
Hospital: Can compare hospitals

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?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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)**

No.

Data Sources: **Are data sources available to support reporting at this level?**
No.

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 available. Since the analysis examined the relationship between two existing measures, we did not formally test any aggregation.

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?**
Not available.

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 aim of this project was to design a way for Medicaid programs to test the relationships between dental prevention and treatment services. This approach included the enhancement of two measures and a testing methodology (as has been described). If Medicaid programs were able to implement this approach it would help them to communicate to families the importance of preventive services to reduce the need for and severity of dental treatment. This may lead to better utilization of preventive services to eventually see a decrease in the utilization of dental treatment services (and the severity of those services that are still needed). Families need to understand why this relationship is so important, both to the health of their children as well as for cost-containment in the Medicaid program. If a trend of increased prevention leads to decreased treatment emerges from a Medicaid office, this could also be a point to communicate to health care providers and purchasers.

Attachment 10.1 (see Supporting Documents) includes a description of the testing methodology to be used by a State Medicaid program that would like to replicate this study. The ability to do this would be the first step towards understandability of the relationships between the measures to then be communicated to purchasers, families, and health care providers to help them understand the quality of dental care for children.

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.

Although the incorporation of these measures into an electronic health record (EHR) was not part of the assigned project, there is a need to better incorporate dental information into the EHR (for health care professionals). There is also a need for electronic dental records to move away from being a practice management system and towards a more comprehensive record that can capture meaningful data and assist practices in designing quality improvement initiatives. Related to the limitations within dental electronic records are the limitations of dental codes and the lack of many diagnostic codes. Currently, most dental services are reported as procedural codes, making it difficult to look at the data collected and determine if preventive oral health care efforts are having an impact on dental treatment and caries experience. Interoperability between medical and dental records is also an issue that needs to be addressed as more health care professionals are becoming involved in preventive oral health care. Without interoperability, it is difficult to form conclusions regarding the impact of preventive services when they take place in the medical and dental settings.

11.B. Health IT Testing

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

No.

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

Not applicable.

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.

Not applicable.

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?

As noted earlier in this section, if these measures and more dental measures were to be incorporated into an EHR, it would be ideal for there to be more specific diagnostic codes for dental disease and for there to be interoperability between medical and dental records. If these two capabilities were addressed and implemented, incorporation of these measures into an EHR could be very powerful in the design of quality improvement projects.

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).

This study had several limitations. It was conducted in one environment, The Truven Health MarketScan® Medicaid Multi-State Research Database. This database contains the medical experience of more than 35 million Medicaid enrollees from multiple States. However, as with any data source, MarketScan claims data have limitations – some have to do with the nature of claims data and others with the nature of the MarketScan sample population. Specifically, the database is based on a convenience sample. Because this sample is not random, it may contain biases or fail to generalize well to other populations. However, these data can complement other datasets or be used as benchmarks against them. And, while the data come from multiple States, individual States cannot be identified due to data release guidelines. If more time were available, the study would have benefited from testing with State Medicaid programs and potentially within individual clinical practices. Other limitations encountered in the study are listed below:

- Relative timing of prevention vs. treatment services – We did not examine whether or not the prevention services preceded the treatment services, only if the children received those services in the same year.

- Lack of data on exclusion criteria - Both measures have exclusion criteria, and these elements were not available in the MarketScan Medicaid database.

- Use of clinician specialty codes – these codes may not be available in all claims data sets and therefore may make replicating these results difficult at the State level.

- The analysis of the relationship between well-child visits and later dental visits was only ecological. Although it produced positive results, the association can only be noted and should not be depicted as a cause and effect relationship.

Finally, there are several limitations within the dental health care delivery system that make the implementation of quality improvement measures in general challenging. The most notable include a coding system that lacks many diagnostic codes to be able to see a true relationship between prevention and treatment; difficulty in using claims data to determine the health of a single tooth and be able to follow it over time, and the limited number of electronic dental records that are certified for meaningful use and are therefore better equipped to incorporate quality measures and collect the appropriate data.

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.

We examined the relationship between Measures 13 and 17 of the CHIPRA Initial Core Set. Following a survey of our Expert Workgroup (see Attachment 13.1 in the Supporting Documents), the following hypotheses were developed: (1) Regular dental prevention utilization results in less frequent dental treatment utilization; (2) Regular dental prevention utilization results in less severe dental treatment utilization; (3) Certain dental preventive services alone or in combination will result in less frequent treatments; (4) Increased utilization of preventive dental services will result in more conservative treatments; and (5) There is an association between well-child visits and a later dental visit.

Our analysis drew the following conclusions:

1. When children receive fluoride varnish application by a medical provider, less frequent dental treatment utilization is realized; however, increased numbers of dental prevention visits and fluoride treatments generally result in higher odds of children receiving any of the analyzed treatment procedures. One possible explanation is that in this population, increased preventive services results in increased recognition of needed treatment. If the study were to be completed over a number of years, we would still expect to see confirmation of the hypothesis 1.

2. In contrast to our hypothesis, we found that the chance of a child receiving either resin restorations or a crown increase as the child receives more preventive dental services. That is,

the odds between children who have one vs two or more amalgam/resin fillings were generally comparable when compared with the number of dental prophys, fluoride treatments overall, or sealants received. Similarly, the odds of receiving a resin restoration or any type of crown seem to be higher per prophy. There was no consistent trend noted with pulpectomy categories. If the study were to be completed over a number of years, we would still expect to see confirmation of hypothesis 2.

3. In general, receiving prevention services was strongly related to more frequent treatments (measured by the total number of surface amalgams and resins received). However, a fluoride treatment by a medical provider was associated with a lower number of treated surfaces and was the only prevention service that was not positively associated with treatment intensity.

4. Depending on the prevention service analyzed, certain dental preventive services resulted in more conservative (less severe) dental treatments. Dental prophy with sealants generally had lower odds of requiring dental treatments than sealants alone. Moreover, sealants, with or without a prophy, had lower odds of an associated treatment versus a dental prophy with or without a fluoride treatment, which are generally comparable to each other.

5. We did find an association between a medical well-child visit and a later dental visit. This is encouraging news as we work towards inter-professional collaboration around oral health but can only be seen at this point as an association, not a correlation or causation.

In conclusion, we do believe that it may be beneficial for State Medicaid programs to conduct these tests over a number of years to analyze the relationships between preventive and dental treatment services in their programs and to further explore the potential benefits of medical/dental collaboration to ensure that more children who are seen in the medical office for well-child care are also seen in the dental office for prevention and dental treatment services.

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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

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.