



Measuring quality of dental care

Caries prevention services for children

Jill Boylston Herndon, PhD; Scott L. Tomar, DMD, MPH, DrPH; Frank A. Catalanotto, DMD; Nancy Rudner, DrPH; I-Chan Huang, PhD; Krishna Aravamudhan, BDS, MS; Elizabeth A. Shenkman, PhD; James J. Crall, DDS, ScD

Dental caries is the most common chronic disease in children in the United States, and more than one-fifth of children living in poverty have untreated dental caries.^{1,2} Untreated dental caries causes significant short- and long-term adverse consequences for children's health and functional status.³ Substantial disparities exist in children's oral health status and use of dental services in the United States.^{1,2,4-6} Two Institute of Medicine (IOM) reports have identified a lack of quality measures as a barrier to improving oral health and reducing oral health disparities.^{7,8} The IOM defines health care quality as "the degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."⁹ Concerned about the lack of oral health care quality measures, the Centers for Medicare and Medicaid Services (CMS) requested that the American Dental Association (ADA) lead the formation of a group of stakeholders to advance performance measurement in dentistry. An ADA-led multi-agency steering committee formed the Dental Quality Alliance (DQA) in 2010 with 1 of its key objectives being to "identify and develop evidence-based oral health care performance measures and measurement

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ABSTRACT

Background. The authors conducted a study to validate the following 3 evidence-based, process-of-care quality measures focused on dental caries prevention for children with an elevated risk of experiencing caries: sealants for 6- to 9-year-olds, sealants for 10- to 14-year-olds, and topical fluoride.

Methods. Using evidence-based guidelines, the Dental Quality Alliance developed measures for implementation with administrative data at the plan and program levels. To validate the measures, the authors used data from the Florida and Texas Medicaid programs and Children's Health Insurance Programs and from national commercial dental benefit plans. Data were extracted from 414 randomly selected dental office records to validate the use of administrative data to accurately calculate the measures. The authors also assessed statistically significant variations in overall measure performance.

Results. Agreement between administrative data and dental records was 95% for sealants ($\kappa = 0.82$) and 90% for topical fluoride ($\kappa = 0.78$). Sensitivity and specificity were 90.7% and 88.5% for topical fluoride and 77.8% and 98.8% for sealants, respectively. Variation in overall measure performance was greatest for topical fluoride ($\chi^2 = 5,887.1$; $P < .01$); 18% to 37% of children with an elevated risk of experiencing caries received at least 2 topical fluoride applications during the reporting year. Although there was greater variation in performance for sealants for 6- to 9-year-olds (range, 21.0-31.3%; $\chi^2 = 548.6$; $P < .01$) compared with sealants for 10- to 14-year-olds (range, 8.4-11.1%; $\chi^2 = 22.7$; $P < .01$), overall sealant placement rates were lower for 10- to 14-year-olds.

Conclusions. These evidence-based, caries prevention process-of-care quality measures can be implemented feasibly and validly using administrative claims data.

Practical Implications. The measures can be used to assess, monitor, and improve the proportion of children with an elevated risk of experiencing dental caries who receive evidence-based caries prevention services.

Key Words. Quality of care; performance measure; caries prevention.

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resources.¹⁰ Its initial measurement set (referred to as the Starter Set) focused on population-based quality measures of caries prevention and disease management for children that can be calculated using administrative data.^{11,12}

The DQA developed the Starter Set measures using a transparent, evidence-informed, consensus-based process. Initial measure concepts were identified using a comprehensive environmental scan and expert consensus rating process regarding each potential measure's importance, feasibility, and validity.¹³ On the basis of the expert ratings and identified gaps in measurement, the DQA selected a subset of measure concepts for measurement development and testing. The DQA's overall approach for measurement development and testing for the Starter Set has been described elsewhere.¹²

The purpose of this article is to provide the details of measure validation for 3 evidence-based, dental care quality measures of caries prevention that were included in the Starter Set: Sealants for 6–9 Year-Old Children at Elevated Caries Risk (Sealants 6–9), Sealants for 10–14 Year-Old Children at Elevated Caries Risk (Sealants 10–14), and Topical Fluoride for Children at Elevated Caries Risk (Topical Fluoride). These 3 measures fall within the category of process-of-care quality measures, in which a process of care is a “health care–related activity performed for, on behalf of, or by a patient.”¹⁴ Process measures should be “supported by evidence that the clinical process—that is the focus of the measure—has led to improved outcomes.”¹⁴ The DQA developed the measures on the basis of evidence regarding the effectiveness of pit-and-fissure sealant placement on permanent molars (process of care) and topical fluoride application (process of care) in reducing dental caries (outcome) in children who have an increased risk of experiencing caries (targeted population for quality measurement as supported by the evidence).^{15,16} An independent expert panel review of the testing results reported in this article determined that the measures met National Quality Forum (NQF) criteria for scientific acceptability of quality measures, and all 3 measures received NQF endorsement (NQF measures 2508, 2509, and 2528).¹⁷ NQF endorsement is an important criterion for quality measure selection among many public and private payers. For example, in 2014, CMS added 1 endorsed measure—Sealants 6–9—to the 2015 Core Set of Children's Health Care Quality Measures for Medicaid and the Children's Health Insurance Program (CHIP).¹⁸

METHODS

Measure specification. On the basis of expert ratings of measure concepts identified through the environmental scan, identified gaps in measurement, and evidence regarding the effectiveness of different processes of care,

the DQA identified professionally applied topical fluoride and pit-and-fissure sealants on permanent molars as primary candidates for caries prevention process-of-care measures associated with improved health outcomes (that is, to reduce dental caries and associated sequelae). The DQA developed the measure specifications to be consistent with the evidence regarding the effectiveness of these procedures and feasible to implement with administrative enrollment and claims data. **Figure 1** summarizes the criteria for each measure's denominator and numerator. The denominator identifies the population who should receive the indicated process of care (that is, topical fluoride or sealants). The numerator is the subset of the population in the denominator who actually received the preventive service. The “measure score” is the numerator divided by the denominator (that is, the percentage of the target population who received the indicated process of care). The detailed measure specifications are publicly available.¹¹

Topical fluoride. High-level evidence suggests that receiving professionally applied topical fluoride, starting as early as 6 months of age and applied at least every 3 to 6 months in children who are at increased risk of experiencing caries, is beneficial in reducing dental caries.¹⁶ The Topical Fluoride quality measure, which measures the percentage of children with an elevated risk of experiencing caries who receive at least 2 topical fluoride applications during the reporting year, directly reflects evidence-based guidelines regarding an effective caries prevention procedure (professionally applied topical fluoride), the population for whom this care is most effective (children at elevated caries risk), and the frequency required for clinical effectiveness (at least every 3 to 6 months). Topical fluoride is identified in the claims data by using the Code on Dental Procedures and Nomenclature (CDT) codes 1206 (topical fluoride varnish application) and 1208 (topical application of fluoride; historical codes D1203 and D1204); thus, both fluoride varnish and fluoride gel applications are captured.

Sealants. Evidence-based clinical guidelines recommend that sealants be placed on pits and fissures of children's primary and permanent teeth when it is determined that the tooth, or the patient, is at risk of experiencing caries, and there is stronger evidence of the effectiveness of sealants that have been placed in

ABBREVIATION KEY. ADA: American Dental Association. CHIP: Children's Health Insurance Program. CMS: Centers for Medicare and Medicaid Services. CY: Calendar year. DBA: Dental benefits administrator. DQA: Dental Quality Alliance. EHR: Electronic health record. IOM: Institute of Medicine. NA: Not applicable. NPV: Negative predictive value. NQF: National Quality Forum. PPV: Positive predictive value. RHIT: Registered health information technician.

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