Original Contributions

Assessing the validity of existing dental sealant quality measures

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Supplemental material is available online.

ABSTRACT

Background. Although sealants are highly effective in preventing caries in children, placement rates continue to be low. The authors' goals were to implement and assess the performance of 2 existing sealant quality measures against a manual audit of charts at 4 dental institutions and to identify measurement gaps that may be filled by using data from electronic health records.

Methods. The authors evaluated the performance of 2 quality measures designed for claims-based data: the Dental Quality Alliance (DQA) sealant measure, which includes patients at risk of developing elevated caries, and the Oregon Health Authority (OHA) sealant measure (irrespective of caries risk). The authors adapted and validated these measures at 4 sites: 3 dental schools and 1 large dental accountable care organization.

Results. The overall modified DQA and modified OHA measure scores in the 6- through 9-year-old age group were 36.1% and 28.8% and in the 10- through 14-year-old age group were 18.5% and 27.2%, respectively. Results from the manual review of charts showed that 67.6% of children who did not receive sealants did not have any teeth to seal because their molars had not yet erupted, had been extracted, had been sealed previously, or had existing caries or restorations.

Conclusions. Both the DQA and OHA measures, which rely mainly on Current Dental Terminology procedure codes, led to underestimation of the care delivered from a practice perspective. Future sealant quality measures should exclude patients whose teeth cannot be sealed.

Practical Implications. This study's results support the suitability of using electronic health record data for assessing the quality of oral health care, particularly for measuring sealant placement in children.

Key Words. Dental sealants; oral health; quality of care; caries risk assessment; caries.

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Caries is one of the most common oral diseases worldwide.[1,2] Caries development occurs in all races and age groups, and the disease affects 60% to 90% of school children and most adults in industrialized countries.[3] Despite established preventive and treatment strategies, caries continues to be a major public health problem producing substantial pain and distress.[4] Up to 90% of carious lesions are found in the pits and fissures of permanent posterior teeth, and, not surprisingly, occlusal surfaces of permanent teeth are 5 times more likely to have caries than are approximal surfaces.[5-9] According to the results of several studies, placement of dental sealants is highly effective in preventing the disease.[5,9-16] Although the placement of dental sealants is improving, actual sealant prevalence rates continue to be low.[17] Results from the 2010 National Health and Nutrition Examination Survey oral health survey[18] show that 32% of 6- through 9-year-olds and 51% of 13- through 15-year-olds had at least 1 sealant placed; caries development risk levels for patients without sealants were not reported, so it is difficult to determine the appropriateness of care from this survey.

National and state agencies have set quality goals to increase sealant placement.[19-21] For example, the Healthy People 2020 objectives[22] are aimed at achieving an increase in sealant placement from 25.5% to 28.1% for 6- through 9-year-old children and from 19.9% to 21.9% for 13- through 15-year-old adolescents. To track progress quantitatively toward these goals, investigators have developed and evaluated clinical quality measures that mainly rely on insurance claims data submitted to government or private payers.[23,24] Although numerous sealant quality measures exist, there are differences in the definitions and specifications of each measure.[25,26] For example, the Oregon Health Authority (OHA) measures define the specifications to evaluate sealants placed on any permanent molar in children aged 6 through 9 years and 10 through 14 years who are enrolled in Medicaid.[27] In contrast, the Dental Quality Alliance (DQA) measure evaluates sealants placed only on permanent first molars for 6- through 9-year-olds and on permanent second molars for 10- through 14-year-olds.[28,29] Moreover, the DQA established that the denominator of the sealants preventive care measure should include only children at moderate or high risk of developing caries. In 2015, Herndon and colleagues[24] validated DQA measures by using administrative claims data from the Florida and Texas Medicaid programs, the Children's Health Insurance Program, and a national dental benefits administrator. They found that rates of sealant placement for 6- 9-year-old children at elevated caries development risk ranged from 21.0% to 31.3%, whereas rates of sealant placement for 10- through 14-year-olds were lower (8.4%-11.1%).

Although administrative claims data are readily available, computer readable, and inexpensive to acquire, they may lack the clinical content necessary to assess accurately the quality of oral health care delivered at a practice level.[23] Measures derived from electronic health records (EHRs) incorporate richer information, such as clinical findings, diagnoses, medical and dental histories, medications, patient complications, severity of illness, and interactions with other aspects of the health care system.[30,31] Recognizing the potential of EHRs to improve quality measurements, the Centers for Medicare & Medicaid Services has offered eligible providers financial incentives for showing meaningful use of EHRs and reporting on the quality of care. This incentive comes in the form of the American Recovery and Reinvestment Act of 2009, which authorized $19 billion in funding for the deployment and meaningful use of EHRs and introduced a national framework for the adoption of health information technology.[32]

The DQA also has expressed interest in reporting clinical quality measures by using EHR data and has proposed the adaptation of its starter set of pediatric oral health measures (administrative and claims data) to e-measures.[33] Unlike claims-based measures that involved using Current Dental Terminology (CDT) procedure codes,[34] the proposed DQA e-measure logic relies on the Systematized Nomenclature of Dentistry and Systematized Nomenclature of Medicine to capture sealant treatment and caries risk levels. Results from a study in which the investigators tested 2 pediatric oral health care electronic quality measures by using synthetic data showed the feasibility of EHR-based measures despite the challenges of infrastructure standards, achieving interoperability, access to unstructured data, and variability in how data are captured in different EHRs.[35] Our goals were to use 2 existing claims-based sealant quality measures from the OHA and DQA and determine how well the measures performed compared with a manual audit of charts at 4 institutions and to identify measurement gaps in the 2 claims-based measures that may be filled by using additional data available in EHRs.

METHODS

We evaluated sealant placement in children as defined by the DQA (with elevated caries risk) and OHA (irrespective of risk) quality measures.[27-29] After receiving institutional review board approval, we implemented the measures at 4 sites: 3 US dental schools and 1 large dental accountable care organization, with 54 dental offices, dispersed across the Pacific Northwest. All 4 sites used the EHR from axiUm (Exan). Investigators originally used the DQA and OHA measures to assess the prevalence of sealant placement on permanent molars in children aged 6 through 9 years and 10 through 14 years by using administrative claims data. These measures were designed for use at a program or system level rather than at the practice level. After reviewing the original measures, we identified the corresponding data points recorded within the EHR to construct the adapted EHR measures in this study.

ABBREVIATION KEY

CDT: Current Dental Terminology.
DQA: Dental Quality Alliance.
EHR: Electronic health record.
NA: Not applicable.
OHA: Oregon Health Authority.