



Final Report on Validating Measures of Overall Provision of Sealants:

Sealant Receipt on Permanent 1st Molars
Sealant Receipt on Permanent 2nd Molars

2019 DQA©

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Executive Summary

Pursuant to concerns expressed by stakeholders including DQA members and the National Quality Forum (NQF) about limitations of the DQA's original sealant measures,¹ the DQA evaluated and approved alternate sealant measure concepts. The resulting concepts address provision of sealants for permanent first molars by the 10th birthday and for permanent second molars by the 15th birthday.

The concepts were tested for validity, feasibility and reliability and have been determined to be able to detect differences in performance scores within a program over time and between programs. Critical data elements needed for computation of the measures are typically available within administrative claims databases and have previously been established as meeting data element reliability and validity standards through chart reviews. Reliability of measure computation can be further assured with clear and detailed standardized specifications.

The table below summarizes the differences between the previous sealant concepts and the newly developed concepts:

Version	Sealants for Children (6-9 or 10-14) at Elevated Risk CLAIMS-BASED PROGRAM/PLAN LEVEL MEASURE	Sealant Receipt on Permanent 1st and 2nd Molars (by age 10 or by age 15) CLAIMS-BASED PROGRAM/PLAN LEVEL MEASURE
Status	Retired, effective January 2020 (specifications will no longer be updated; previous versions may be used at the program's discretion)	Approved for use, effective January 1, 2020
Purpose	Assesses the number of children with at least one sealant placed in the reporting year. Encourages the provision of sealants to children inferred to be at elevated risk.	Assesses the number of children in the program who ever received sealants (regardless of caries risk). Population-based measure that promotes sealing all molars by specified age for the enrolled population.
Population assessed	Patients enrolled in the program who are inferred to be at elevated risk through provider assessment or prior claims history of caries-related treatment. (Thus, the measures only capture patients who have accessed the dental care system.)	All patients within the specified age ranges, regardless of caries risk status or prior access to the dental care system.
Age	Within the age range of 6 – 9 years /10 – 14 years in the reporting year.	Children have their 10 th birthdate/15 th birthdate in the reporting year.
Intervention assessed	At least one sealant in reporting year	(1) At least one sealant in the 48 months prior to the birthdate and (2) All four molars ever sealed in the 48 months prior to the birthdate
Exclusions	No specific exclusions; however, children who have had no contact with the dental care system or have not received dental treatment used to identify elevated risk are not included in the measure.	Excludes children when claims data indicates that all four molars (1 st or 2 nd , depending on the measure) have been previously treated and the child likely has no sealable molars.

¹ Sealants for 6–9 year-old Children at Elevated Risk, Dental Services
Sealants for 10-14 year-old Children at Elevated Risk, Dental Services

Purpose

The purpose of this report is to summarize the validation of the following measures that address provision of sealants on *permanent 1st molars by the 10th birthdate* and on *permanent 2nd molars by the 15th birthdate*.

- Sealant Receipt on Permanent 1st Molars
- Sealant Receipt on Permanent 2nd Molars

Background

The DQA began evaluating its **program/plan level sealant measures** pursuant to concerns expressed from members of the DQA as well as the National Quality Forum (NQF). These measures were:

1. [Sealants for 6–9 Year-Old Children at Elevated Caries Risk](#)
2. [Sealants for 10-14 Year-Old Children at Elevated Caries Risk](#)

DQA's evaluation included the establishment of an ad-hoc workgroup in 2018, comprised of 12 members that represented payers, state Medicaid agencies, providers and health services researchers. Representatives from the Centers for Medicare & Medicaid Services (CMS) and the Agency for Healthcare Research and Quality (AHRQ) participated in the workgroup as technical advisors. The workgroup's recommendation was further vetted by the DQA's Measures Development and Maintenance Committee (MDMC). A [list of participants](#) appears at the end of this report.

The workgroup reviewed the 6–9 year-old measure that addressed annual receipt of sealants. The workgroup systematically conducted its evaluation and determined that assessing the percentage of children “ever receiving” sealants addressed the aforementioned stakeholders' concerns. The workgroup further conducted validity testing of the concept and developed a measure of sealant receipt on permanent 1st molars by the 10th birthdate. The measure was approved by the DQA at its June 2019 meeting. The DQA also approved retiring the previous sealant measure. The MDMC subsequently conducted similar testing to validate the concept of sealant receipt on permanent 2nd molars by the 15th birthdate. The measure on sealant receipt on second molar is scheduled for DQA's approval at its November meeting.

This report describes the workgroup's development and validation of Sealant Receipt on Permanent 1st Molars as well as the subsequent validation conducted by the MDMC of the counterpart measure Sealant Receipt on Permanent 2nd Molars.

Sealant Receipt on Permanent 1st Molars: Workgroup Development and Validation

Methodology

The workgroup began by defining the measure concept and focused on the DQA measure of sealant receipt on permanent 1st molars for 6–9 year-olds. The workgroup explored two options:

(1) revising the original DQA sealant measure of annual receipt of sealants and (2) developing a new measure of “ever receiving” a sealant.

Evaluation #1: The workgroup considered **revising the original DQA sealant measure**² such that it would reflect **performance based on measuring delivery of sealants in the reporting year (annual) for children who have not previously received sealants and could benefit from sealants:** Of those children aged 7–9 years enrolled in a program/plan, how many eligible for sealants and with no prior sealants receive at least one sealant on a permanent first molar in the reporting year.

Evaluation #2: The workgroup also evaluated **a new measure** that reflects **performance based on measuring the overall percentage of children who have ever received sealants on permanent first molars by the child’s 10th birthdate with two measure scores reported (at least one sealant and four sealants):** Of those children enrolled in a program/plan, how many have ever received (1) at least one sealant (measure score 1) and (2) all four sealants (measure score 2) on permanent first molars by the child’s 10th birthdate.

Administrative enrollment and claims data (paid and unpaid claims) from the following nine programs were used for testing:

- Delta Dental of Massachusetts
- Delta Dental of Wisconsin
- DentaQuest Florida Medicaid
- DentaQuest Texas Medicaid/CHIP
- MCNA Louisiana Medicaid
- MCNA Texas CHIP
- MCNA Texas Medicaid
- Oregon Medicaid
- University of Pittsburgh Medical Center (UPMC) Health Plan

Detailed specifications and data templates were developed and provided to the data partners to enable evaluation of the measures. Results of the evaluations and workgroup recommendations are presented below.

Evaluation #1 RESULTS: Annual Receipt of Sealants

Some DQA members raised concerns with the validity of the current measure because children who did not have an opportunity to be sealed (did not have any “sealable molars”) were counted in the denominator. There were also concerns on limiting the denominator to only a subset of population that was inferred to be at elevated risk.³

Measure Conceptualization

The workgroup considered the following revisions to the original DQA measure denominator:

² **DQA original sealant measure:** Of those children, aged 6-9 years enrolled in a program/plan and at elevated risk for dental caries, how many receive at least one sealant on a permanent first molar in the reporting year.

³ 2018 Annual Measure Review Sealant Report. Report from the DQA Measures Development and Maintenance Committee. June 2018. Accessed from: https://www.ada.org/~media/ADA/DQA/FINAL%202018%20AMR%20Report_Sealant.pdf?la=en

- removing the limitation to children with “elevated” risk to include children regardless of caries risk status;
- adjusting the age to start at age 7 (instead of age 6) to reduce the effect of un-erupted teeth; and
- incorporating exclusions into the denominator to remove children who can be identified in administrative claims data as not having any sealable molars.

Removal of “elevated risk” from the denominator

The current DQA measure limits the denominator population to children who can be inferred to be at “elevated risk” (through prior restorative history OR assessment by the clinician with documentation through CDT codes) – in essence, a systematic sample of the population of interest. This approach was designed as a sampling technique to identify a subset of children who could be considered to be a higher priority to receive preventive services.

The workgroup evaluated the ADA Center for Evidence-Based Dentistry guideline on sealants that was released after the original measure was developed.⁴ The workgroup noted that the guideline strongly recommended sealants over non-use of sealants for permanent molars. The guideline also notes that “A number of studies have shown that sealing children’s and adolescents’ permanent molars reduces costs to the health system by delaying and preventing the need for invasive restorative treatment, *particularly when these patients are classified as having an “elevated caries risk”* (that is, previous caries experience). Under these conditions, dental sealants seem to be a cost-effective intervention.”

The workgroup also evaluated the work of the DQA’s caries risk assessment guidance panel (on file with the DQA). In particular, the workgroup noted the panel’s observation that “*a large number of people at low risk may give rise to a larger total number of cases of disease (i.e., the number of people getting cavities) than a small number at high risk.*” Given these views, the workgroup concluded that assessment of performance should focus on **children without regard to caries risk status**.

Adjusting the lower bound of the age range to 7 years

The original development effort of the sealant measure noted the following distribution of sealant placement across the age groups.⁵

Age	Total enrolled (Denominator)	Sealant in 1 st permanent molar	Rate
6	207,954	28,558	13.73%
7	189,763	49,712	26.20%
8	177,619	38,301	21.56%
9	171,864	24,063	14.00%
10	163,284	16,177	9.91%

Based on this age distribution of sealant receipt, accepted tooth eruption patterns, and the recommendations to promote placement of sealants soon after tooth eruption, the DQA had

⁴ J Am Dent Assoc. 2016 Aug;147(8):672-682.e12. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants: A report of the American Dental Association and the American Academy of Pediatric Dentistry. Wright JT, Crall JJ, Fontana M, Gillette EJ, Nový BB, Dhar V, Donly K, Hewlett ER, Quinonez RB, Chaffin J, Crespin M, Iafolla T, Siegal MD, Tampi MP, Graham L, Estrich C, Carrasco-Labra A.

⁵ DQA Evaluation of Starter Set. Report on file. Data from Texas Medicaid. Appendix J.

established the appropriate age range of the current sealant measure to include children between 6–9 years (≥ 6 and ≤ 9 at the last day of the reporting year).

However, at least one recently published study noted that 40% of children who qualify for the denominator did not have any erupted permanent first molars.⁶ Given that the DQA measure is more recently being used for performance evaluations with benchmarks, the workgroup recommended limiting the range to 7–9 years to mitigate the issue of children not being eligible for sealants due to unerupted teeth.

Incorporating exclusions into the denominator

Exclusion #1: Excluding children with prior treatment history

The workgroup noted that children with ALL four permanent first molars restored, extracted or otherwise treated were not eligible to receive sealants; (i.e., qualify for inclusion in the numerator). In prior deliberations, the DQA's Measures Development and Maintenance Committee (MDMC) had decided not to apply such exclusions because:

- comparisons could be biased if programs have significant differences in (1) average enrollment duration or (2) differences in the availability of historical claims to consistently apply exclusions;
- measure complexity would increase; and
- programs with more children with advanced treatments for caries may result in more exclusions in the denominator and a higher measure score signifying “better” quality even though the children with the disease had not received the recommended preventive care.

However, the workgroup concluded that because the measure was meant to specifically address performance based on receipt of sealants in the reporting year rather than assess the health status of the population, it would be appropriate to exclude the children with prior treatment history. The workgroup acknowledged that this revision would improve measure concept validity but increase computation complexity and potentially reduce reliability for between-program comparisons based on the availability of complete historical data.

Exclusion #2: Excluding children with prior sealant placement history

The workgroup determined that plan performance should focus on **enabling children to gain access to sealants**. To this end, the workgroup decided to exclude children who have documented access to sealants in the prior years by **excluding children who have had even one sealant** in any of the permanent first molars in prior years.

Measure Testing

Specification Reliability

Detailed specifications were made available to all data partners. While programming the measure, one data team raised questions about the specifications related to exclusions. The team was unsure how the exclusions were to be unduplicated and reported. Clarity was added

⁶ J Am Dent Assoc. 2018 Sep;149(9):756-764.e1. Assessing the validity of existing dental sealant quality measures. Kumar SV, Bangar S, Neumann A, Kookal KK, Yansane A, Tokede O, Obadan-Udoh E, Mertz E, Simmons K, Even J, Mullins J, White J, Kalenderian E, Walji M.

to the specifications to address this issue. Specifications used for testing different variations of the measure(s) are on file with the DQA

Ability to Detect Differences

[Appendix 1](#) includes the data as reported by the data partners.

The workgroup evaluated the measure to determine its ability to detect performance changes **within** the program over time and **between** programs. The scores presented represented the revised measure as conceptualized by the workgroup: all children aged 7–9 years with exclusions for prior treatment history on all four permanent first molars and exclusions for prior sealant history for at least one permanent first molar.

The measure scores were calculated and reported with their 95% confidence intervals and standard deviations. Comparisons of the 95% confidence intervals and chi-square tests were used to evaluate whether the measure detected variations in performance: (1) between years within a program (Table 1) and (2) between programs (Table 2). The following summaries provide the results of this evaluation.

Table 1 illustrates the **within program comparisons over time**. The year-to-year differences in performance **were statistically significant for all years for programs 1, 6, 8, and 9 based on chi-square tests** (Table 1). There were statistically significant differences for some of the year-to-year comparisons for programs 2, 3 and 4.

Table 2 illustrates the **between program** comparisons for 2017. The measure scores ranged from 21%–32%. The chi-square statistic for comparisons of all program measure scores (9x2 contingency table) was statistically significant ($X^2=1.55E+06$, $p<0.0001$). The measure score differences between pairs of programs **were statistically significant (at the p=0.05 level) except for the scores between programs 1 and 4** based both on an evaluation of the confidence intervals and chi-square tests. Non-overlapping confidence intervals can be used to infer a statistically significant difference. However, there may be statistically significant differences when confidence intervals exhibit a small degree of overlap. In those cases, chi-square tests were used to evaluate between-program differences.

Table 1. Performance Scores and Year-to-Year Tests of Change, 7–9 Years, with Exclusions for Prior Treatment History and at Least One Prior Sealant on Permanent First Molars

	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 1							
2014	19639	15.80%	0.0026	0.1529	0.1631		
2015	21438	17.49%	0.0026	0.1698	0.1800	21.13	<.0001
2016	22641	19.41%	0.0026	0.1889	0.1992	26.94	<.0001
2017	22793	20.94%	0.0027	0.2041	0.2146	16.49	<.0001
Data Set 2							
2014	60459	27.57%	0.0018	0.2721	0.2793		
2015	60035	27.98%	0.0018	0.2762	0.2834	2.58	0.1082
2016	58908	27.88%	0.0018	0.2751	0.2824	0.17	0.6801

2017	63698	26.41%	0.0017	0.2607	0.2676	33.1	<.0001
Data Set 3							
2014	49091	25.04%	0.0020	0.2466	0.2542		
2015	56085	24.68%	0.0018	0.2432	0.2503	1.84	0.1750
2016	59735	24.99%	0.0018	0.2464	0.2533	1.49	0.2222
2017	57243	25.66%	0.0018	0.2530	0.2602	7.05	0.0079
2018	57661	25.29%	0.0018	0.2493	0.2564	2.15	0.1426
Data Set 4							
2014	88303	18.78%	0.0013	0.1852	0.1904		
2015	96036	18.08%	0.0012	0.1783	0.1832	15.28	<.0001
2016	94898	20.56%	0.0013	0.2030	0.2082	189.4	<.0001
2017	87214	20.69%	0.0014	0.2042	0.2096	0.47	0.4930
2018	81048	20.87%	0.0014	0.2059	0.2115	0.8	0.3711
Data Set 5							
2014	35300	19.90%	0.0021	0.1948	0.2032		
2015	24985	20.36%	0.0025	0.1986	0.2086	1.92	0.1659
2016	26144	20.05%	0.0025	0.1957	0.2054	0.76	0.3833
2017	23395	20.02%	0.0026	0.1950	0.2053	0.01	0.9203
2018	21273	19.46%	0.0027	0.1892	0.1999	2.21	0.1371
Data Set 6							
2014	136475	30.16%	0.0012	0.2992	0.3041		
2015	142856	31.47%	0.0012	0.3122	0.3171	55.44	<.0001
2016	134575	31.85%	0.0013	0.3160	0.3209	4.63	0.0314
2017	116540	31.13%	0.0014	0.3086	0.3140	14.81	0.0001
2018	96874	30.56%	0.0015	0.3027	0.3085	8.16	0.0043
Data Set 7							
2016	183158	32.23%	0.0011	0.3202	0.3245		
2017	191226	32.17%	0.0011	0.3196	0.3237	0.19	0.6629
Data Set 8							
2014	90902	15.51%	0.0012	0.1528	0.1575		
2015	67143	20.18%	0.0015	0.1988	0.2049	583.74	<.0001
2016	80326	22.31%	0.0015	0.2202	0.2259	98.32	<.0001
2017	75277	22.97%	0.0015	0.2267	0.2327	9.76	0.0018
Data Set 9							

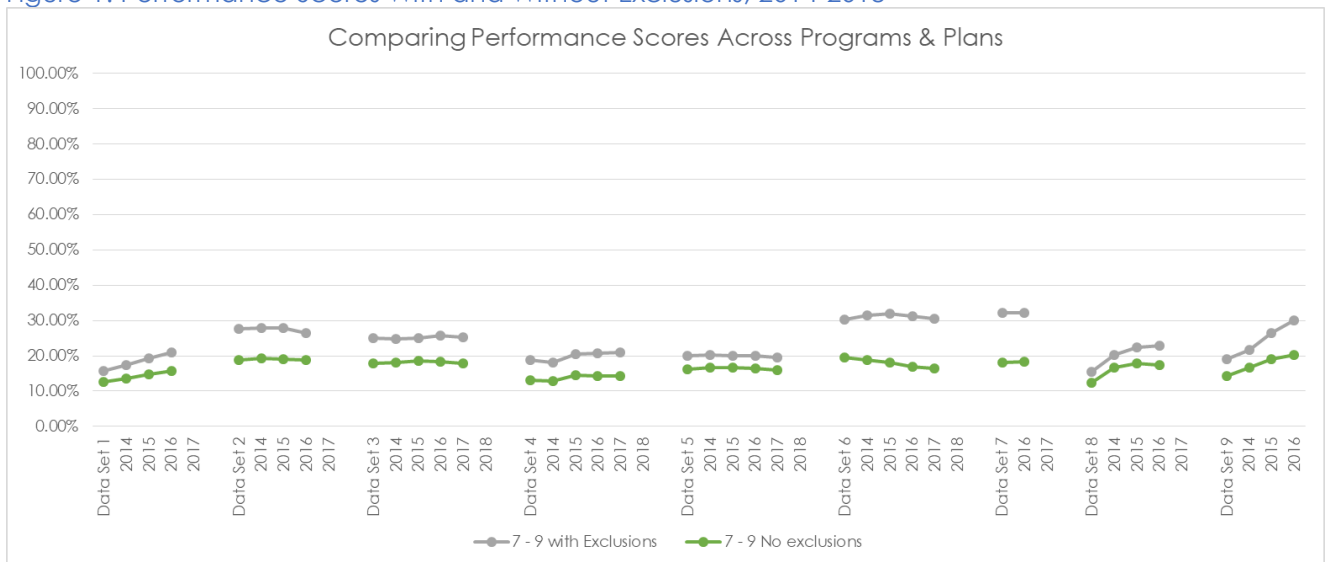
2014	37997	19.15%	0.0020	0.1875	0.1954		
2015	50762	21.66%	0.0018	0.2130	0.2202	83.99	<.0001
2016	45524	26.55%	0.0021	0.2614	0.2695	314.73	<.0001
2017	42626	30.00%	0.0022	0.2956	0.3043	129.15	<.0001

Table 2. Between Program Comparisons, 2017
 Programs ranked from lowest to highest score

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
5	20.02%	0.0026	0.1950	0.2053
4	20.69%	0.0014	0.2042	0.2096
1	20.94%	0.0027	0.2041	0.2146
8	22.97%	0.0015	0.2267	0.2327
3	25.66%	0.0018	0.2530	0.2602
2	26.41%	0.0017	0.2607	0.2676
9	30.00%	0.0022	0.2956	0.3043
6	31.13%	0.0014	0.3086	0.3140
7	32.17%	0.0011	0.3196	0.3237

Figure 1 provides a visualization of the compared measure scores with and without exclusions. When comparing trends over time, the effect of exclusions was more pronounced for some programs versus others.

Figure 1. Performance Scores With and Without Exclusions, 2014-2018



Critical Data Element Validity

The critical data elements needed to calculate the measure using the revised specifications are the same as the critical data elements that were validated during testing of the DQA's Pediatric Starter Set. Since critical data element validity—established by using dental records to examine the agreement between claims data and dental records and evaluate concordance by

calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the Kappa statistic—has been documented earlier, the workgroup did not repeat these analyses.^{7,8}

Difference between Original DQA Measure and Revised Measure

The workgroup did not request data from all data partners comparing the original measure with the revised measure. Based solely on the data available to the DQA on file from prior measure testing efforts, the workgroup was able to compare the measure score for the original DQA measure and the revised measure. The data is representative of **a single dental plan** in one Medicaid program and one CHIP program within a state (represents Datasets 5 and 6 within this report).⁹

Data Set 5

	CHIP			
	2014	2015	2016	2017
Original Measure: 6–9; Elevated Risk; No Exclusions	25.10%	24.70%	23.10%	22.80%
Original Measure: 6–9; Elevated Risk; Prior ALL 4 Sealants excluded	27.60%	27.10%	24.90%	24.70%
Workgroup Measure: 7–9; All Children; No exclusions	16.24%	16.58%	16.67%	16.48%
Workgroup Measure: 7–9; All Children; Prior treatment or at least one sealant excluded	19.90%	20.36%	20.05%	20.02%

Data Set 6

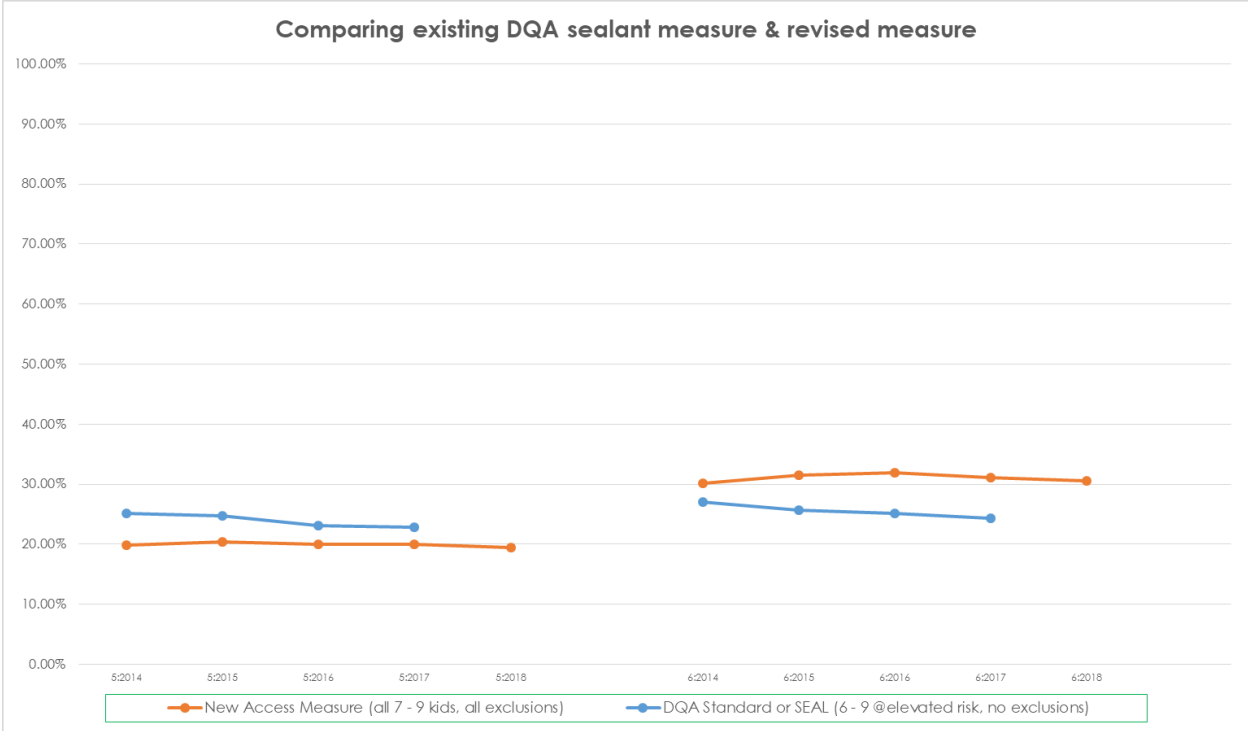
	Medicaid			
	2014	2015	2016	2017
Original Measure: 6–9; Elevated Risk; No Exclusions	27.00%	25.70%	25.10%	24.30%
Original Measure: 6–9; Elevated Risk; Prior ALL 4 Sealants excluded	30.10%	29.80%	29.70%	29.40%
Workgroup Measure: 7–9; All Children; No exclusions	19.52%	18.80%	18.14%	17.00%
Workgroup Measure: 7–9; All Children; Prior treatment or at least one sealant excluded	30.16%	31.47%	31.85%	31.13%

⁷ Herndon, J. B., Crall, J. J., Aravamudhan, K., et al. (2015). Developing and testing pediatric oral healthcare quality measures. *Journal of Public Health Dentistry*, 75(3), 191-201

⁸ Herndon, J. B., Tomar, S. L., Catalanotto, F. A., Rudner, N., Huang, I. C., Aravamudhan, K., ... & Crall, J. J. (2015). Measuring quality of dental care: Caries prevention services for children. *The Journal of the American Dental Association*, 146(8), 581-591.

⁹ DQA Annual Review Report. On file.

Figure 2. Performance Scores Comparing Original DQA Measure with Revised Measure, 2014-2018



Workgroup Observations & Recommendations: Consensus of the workgroup was that the face validity of the original measure could be improved with the various modifications considered. The revised measure is in itself able to detect differences in performance scores within a program over time and between programs. Critical data elements needed for computation of the measure are typically available within administrative claims databases and have previously been established as meeting data element reliability and validity standards through chart reviews. Reliability of measure computation can be further assured with clear and detailed standardized specifications.

The revised measure continues to have limitations identified in the original DQA measure, including that claims data cannot identify (1) teeth with active decay or (2) sealants not billed to the program, thus impacting the precision of both the numerator and denominator.

The revised measure will have the following additional limitations:

(1) Programs with more children with advanced treatments for caries may have higher scores due to the exclusions and thus appear to have relatively “better” quality. This can, however, be addressed by requiring reporting of the number of exclusions when reporting measure scores.

(2) Comparisons would be biased **if** programs being compared have significant differences in enrollment duration resulting in differences in the availability of complete treatment history for enrollees (due to not having claims data for treatment rendered outside of program enrollment) to consistently identify children who should be excluded from the denominator. However, this is not unique to dental measures.

Conceptually, the original DQA measure targets the group of children who can be inferred to be at elevated risk as a priority population. The revised measure targets children without regard to their caries risk status.

Based upon the inability to mitigate these limitations and the relatively small and inconsistent impact of the revised methods on measure score trends, the consensus of the workgroup was to recommend discontinuing the use of the concept “annual receipt of sealants.”

Evaluation #2 RESULTS: Overall Receipt of Sealants by the child's 10th Birthdate

During NQF's review¹⁰ of the endorsement maintenance of the DQA measures, members of the NQF committee:

- 1) disagreed with the intent of the measure as specified by the DQA and expressed interest in a measure that instead assesses whether children are "up-to-date" with sealants,
- AND
- 2) disagreed with specifying the measure for a "reporting year" and instead favored a measure that assesses "ever receiving" sealants.

Following NQF and stakeholder feedback, the DQA adopted the following resolution in 2018:

Resolved, that the Measures Development & Maintenance Committee explore the advisability of developing a population health oriented sealant measure that addresses sealant prevalence at a systems level.

Measure Conceptualization

The workgroup evaluated a measure to assess **performance based on the overall percentage of children who have ever received sealants by the child's 10th birthdate with two measure scores reported (at least one sealant and four sealants)**: Of those children enrolled in a program/plan, how many children have ever received (1) at least one sealant (measure score 1) and (2) four sealants (measure score 2) on permanent first molars by the child's 10th birthdate, excluding children who have all four molars otherwise treated.

Excluding children with "all four" molars otherwise treated (non-sealable)

As conceptualized, the measure denominator only excludes children with "all four" molars otherwise treated as identifiable with administrative claims data. While this allows all children in the denominator to be eligible for numerator 1 (at least one sealant); children who have even one of the four permanent molars otherwise treated will not be eligible for numerator 2 (all four sealants). Nevertheless, the workgroup agreed that it was important to understand the percentage of children who have experience receiving any sealants who go on to receive sealants in all four of their first molar teeth and are thus "up-to-date" with their sealants. It also allows the measure to serve as an appropriate proxy indicator of population health because it signifies that the children do not have disease in any of the permanent first molars. Although excluding children with treatment in some, but not all, of the four molars would add precision in terms of identifying children with mixed treatment in the permanent first molars, the additional measurement calculation complexity was viewed as too burdensome relative to the additional information yielded to drive quality improvement efforts.

¹⁰ National Quality Forum. Prevention and Population Health, Fall 2017 Cycle: CDP Report. August 7, 2018. Available at: http://www.qualityforum.org/Publications/2018/08/Prevention_and_Population_Health_Final_Report_-_Fall_2017_Cycle.aspx.

Effect of administrative claims data limitations

While providing a systematic approach to evaluating the percentage of the population who received sealants, ANY measure based solely on administrative and claims data will have the following limitations:

- cannot exclude children who have active decay and/or restorations/extractions provided prior to program/plan enrollment; and
- cannot include children who have received sealants that were
 - provided prior to program/plan enrollment or
 - provided while enrolled but not billed to the program/plan being measured; e.g., school-based sealant programs and other public programs.

While it is ideal for states to begin collecting ICD diagnosis codes to document dental conditions for exclusions, defining the measure dependent on future reporting of ICD codes is not a valid approach. Data element validity cannot be established. While claims systems have the capability of accepting ICD codes, provider training, collection and validation of coding must precede measure implementation.

A hybrid approach (which uses both administrative claims as well as a sample of clinical charts to compute the measure score) could be used to include children who could not be positively identified to be placed into the numerator through claims analysis alone. While possible, such an approach increases administrative burden for both plans and providers. Some CMS Core Set of Children's Health Care Quality Measures for Medicaid and CHIP (Child Core Set) use the hybrid approach as an **optional** method, creating a situation where measure scores between programs may not be comparable if some programs use a hybrid approach and others use administrative claims data only. At least one workgroup member noted that even with hybrid approaches, there may be variations in data quality and abstraction processes that threaten measure score accuracy and reliability.

The workgroup proceeded evaluating the measure using only an administrative claims-based specification acknowledging that the above limitations prevent the measure score from reflecting the true “prevalence” of sealants in the population. Because a hybrid measure may improve precision of the measure score, the workgroup urged the DQA to continue to assess the feasibility of a hybrid approach for a future version of the measure. In addition, the workgroup noted the need to assess the potential of including diagnostic codes in the administrative claims-based measure when such codes are reported through the claims system.

Measure Testing

Specification Reliability

Detailed specifications were made available to all data partners. While programming the measure, two data teams raised questions about the specifications regarding the age calculation. Clarity was added to the specifications to address this issue.

Ability to Detect Differences

[Appendix 2](#) includes the data as reported by the data partners. *Note: These data represent the measure scores before the anchor date and enrollment criteria were finalized. These scores reflect an enrollment requirement of 180 days continuous enrollment during the reporting year.*

The workgroup evaluated the measure to determine if it is able to detect performance changes **within** the program over time and **between** programs. The measure scores represented the new measure as conceptualized by the workgroup: sealant receipt among all children by their 10th birthdate with exclusions for prior treatment history on all four permanent first molars. The measure has two reported rates: (1) children who received at least one sealant on a permanent first molar and (2) children who received sealants on all four permanent first molars.

The measure scores were calculated and reported with their 95% confidence intervals and standard deviations. Comparisons of the 95% confidence intervals and chi-square tests were used to evaluate whether the measures detected variations in performance: (1) between years within a program (Tables 3 and 5) and (2) between programs (Tables 4 and 6). The following summaries provide the results of this evaluation. *Note: These data represent the score before the anchor date and enrollment criteria were finalized.*

Results for at least one permanent first molar sealed by the child's 10th birthdate

Table 3 illustrates the **within program comparisons**. The year-to-year differences in performance **were statistically significant for all years for programs 1, 3, 8, and 9 based on chi-square tests**. There were statistically significant differences for some of the year-to-year comparisons for Programs 2, 4, 5, and 6.

Table 4 illustrates the **between program** comparisons for 2017. The measure scores ranged from 32% to 75%. The chi-square statistic for comparisons of all program measure scores (9x2 contingency table) was statistically significant ($X^2=1.35E+07$, $p<0.0001$). The measure score differences between pairs of programs **were statistically significant (at the p=0.05 level) except for the scores between programs 1 and 3 and programs 8 and 9** based both on an evaluation of the confidence intervals and chi-square tests. Non-overlapping confidence intervals can be used to infer a statistically significant difference. However, there may be statistically significant differences when confidence intervals exhibit a small amount of overlap. In those cases, chi-square tests were used to evaluate between-program differences.

Table 3. Performance Scores for At Least One Sealant Placement by 10th Birthdate and Year-to-Year Tests of Change

	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 1							
2014	7490	40.76%	0.0057	0.3965	0.4187		
2015	8560	45.35%	0.0054	0.4430	0.4641	34.29	<.0001
2016	9595	47.23%	0.0051	0.4623	0.4823	6.45	0.0111
2017	9926	49.57%	0.0050	0.4858	0.5055	10.64	0.0011
Data Set 2							

2014	29656	59.21%	0.0029	0.5865	0.5977		
2015	29272	58.72%	0.0029	0.5815	0.5928	1.47	0.2253
2016	29224	59.08%	0.0029	0.5852	0.5965	0.81	0.3681
2017	31049	55.51%	0.0028	0.5495	0.5606	78.79	<.0001
Data Set 3							
2014	23173	51.78%	0.0033	0.5114	0.5243		
2015	25988	48.42%	0.0031	0.4781	0.4903	55.51	<.0001
2016	27727	46.92%	0.0030	0.4633	0.4751	12.11	0.0005
2017	27481	50.50%	0.0030	0.4991	0.5109	70.75	<.0001
2018	28346	52.70%	0.0030	0.5211	0.5328	27.01	<.0001
Data Set 4							
2014	36614	50.72%	0.0026	0.5021	0.5123		
2015	41074	51.20%	0.0025	0.5072	0.5169	1.82	0.1773
2016	42656	51.79%	0.0024	0.5132	0.5227	2.92	0.0875
2017	41756	53.17%	0.0024	0.5269	0.5365	16.11	<.0001
2018	39276	55.34%	0.0025	0.5485	0.5583	38.34	<.0001
Data Set 5							
2014	13850	35.68%	0.0041	0.3488	0.3648		
2015	9833	37.83%	0.0049	0.3687	0.3879	11.45	0.0007
2016	10124	32.84%	0.0047	0.3193	0.3376	54.36	<.0001
2017	9621	32.37%	0.0048	0.3143	0.3330	0.51	0.4751
2018	9277	32.55%	0.0049	0.3160	0.3351	0.08	0.7773
Data Set 6							
2014	53965	58.11%	0.0021	0.5769	0.5852		
2015	66125	68.02%	0.0018	0.6766	0.6838	1260.46	<.0001
2016	65809	73.31%	0.0017	0.7297	0.7365	445.37	<.0001
2017	63410	75.06%	0.0017	0.7472	0.7539	51.34	<.0001
2018	59876	75.42%	0.0018	0.7507	0.7576	2.16	0.1416
Data Set 7							
2016	98544	68.71%	0.0015	0.6842	0.6899		
2017	99897	69.09%	0.0015	0.6880	0.6938	3.45	0.0633
Data Set 8							
2014	35112	37.50%	0.0026	0.3700	0.3801		
2015	26395	38.65%	0.0030	0.3806	0.3924	8.44	0.0037
2016	32984	42.00%	0.0027	0.4147	0.4253	68.19	<.0001

2017	33313	48.04%	0.0027	0.4751	0.4858	244.68	<.0001
Data Set 9							
2014	15661	40.71%	0.0039	0.3994	0.4148		
2015	20799	37.06%	0.0033	0.3641	0.3772	49.98	<.0001
2016	20137	42.53%	0.0035	0.4185	0.4321	127.56	<.0001
2017	21078	48.18%	0.0034	0.4751	0.4886	132.81	<.0001

Table 4. Between Program Comparisons, 2017
Programs ranked from lowest to highest score

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
5	32.37%	0.0048	0.3143	0.3330
8	48.04%	0.0027	0.4751	0.4858
9	48.18%	0.0034	0.4751	0.4886
1	49.57%	0.0050	0.4858	0.5055
3	50.50%	0.0030	0.4991	0.5109
4	53.17%	0.0024	0.5269	0.5365
2	55.51%	0.0028	0.5495	0.5606
7	69.09%	0.0015	0.6880	0.6938
6	75.06%	0.0017	0.7472	0.7539

Results for ALL four permanent first molars sealed by the child's 10th birthdate

Table 5 illustrates the **within program comparisons**. The year-to-year differences in performance **were statistically significant for all years for programs 1, 3, 4, 8 and 9 based on chi-square tests**. There were statistically significant differences for some of the year-to-year comparisons for Programs 2, 5, and 6.

Table 6 illustrates the **between program** comparisons for 2017. The measure scores ranged from 19% to 47%. The chi-square statistic for comparisons of all program measure scores (9x2 contingency table) was statistically significant ($X^2=3.84E+05$, $p<0.0001$). The measure score differences between programs **were statistically significant (at the p=0.05 level) except for the scores between programs 1 and 8 and programs 4 and 9** based both on an evaluation of the confidence intervals and chi-square tests. Non-overlapping confidence intervals can be used to infer a statistically significant difference. However, there may be statistically significant differences when confidence intervals exhibit a small amount of overlap. In those cases, chi-square tests were used to evaluate between-program differences.

Table 5. Performance Scores for All 4 Molars Sealed by the 10th Birthdate and Year-to-Year Tests of Change

Data Set	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes
2014	7490	24.21%	0.0049	0.2324	0.2518	
2015	8560	29.03%	0.0049	0.2807	0.2999	47.42 <.0001

2016	9595	30.98%	0.0047	0.3006	0.3191	8.22	0.0041
2017	9926	33.95%	0.0048	0.3302	0.3488	19.57	<.0001
Data Set 2							
2014	29656	46.91%	0.0029	0.4635	0.4748		
2015	29272	46.79%	0.0029	0.4622	0.4736	0.09	0.7642
2016	29224	47.81%	0.0029	0.4724	0.4839	6.12	0.0134
2017	31049	44.96%	0.0028	0.4441	0.4552	49.14	<.0001
Data Set 3							
2014	23173	40.16%	0.0032	0.3953	0.4079		
2015	25988	38.39%	0.0030	0.3780	0.3899	15.99	<.0001
2016	27727	36.97%	0.0029	0.3640	0.3754	11.58	0.0007
2017	27481	40.14%	0.0030	0.3956	0.4072	58.65	<.0001
2018	28346	41.59%	0.0029	0.4101	0.4216	12.01	0.0005
Data Set 4							
2014	36614	34.15%	0.0025	0.3366	0.3463		
2015	41074	34.99%	0.0024	0.3453	0.3545	6.11	0.0134
2016	42656	36.52%	0.0023	0.3607	0.3698	21.37	<.0001
2017	41756	37.92%	0.0024	0.3745	0.3839	17.65	<.0001
2018	39276	39.81%	0.0025	0.3932	0.4029	30.36	<.0001
Data Set 5							
2014	13850	20.49%	0.0034	0.1982	0.2116		
2015	9833	22.59%	0.0042	0.2176	0.2341	15.04	0.0001
2016	10124	19.20%	0.0039	0.1843	0.1997	34.62	<.0001
2017	9621	19.44%	0.0040	0.1865	0.2023	0.17	0.6801
2018	9277	19.23%	0.0041	0.1843	0.2003	0.13	0.7184
Data Set 6							
2014	53965	29.57%	0.0020	0.2919	0.2996		
2015	66125	40.92%	0.0019	0.4054	0.4129	1664.21	<.0001
2016	65809	45.81%	0.0019	0.4542	0.4619	320.80	<.0001
2017	63410	47.41%	0.0020	0.4702	0.4780	33.51	<.0001
2018	59876	47.96%	0.0020	0.4756	0.4836	3.72	0.0538
Data Set 7							
2016	98544	43.54%	0.0016	0.4323	0.4385		
2017	99897	43.79%	0.0016	0.4348	0.4409	1.21	0.2713

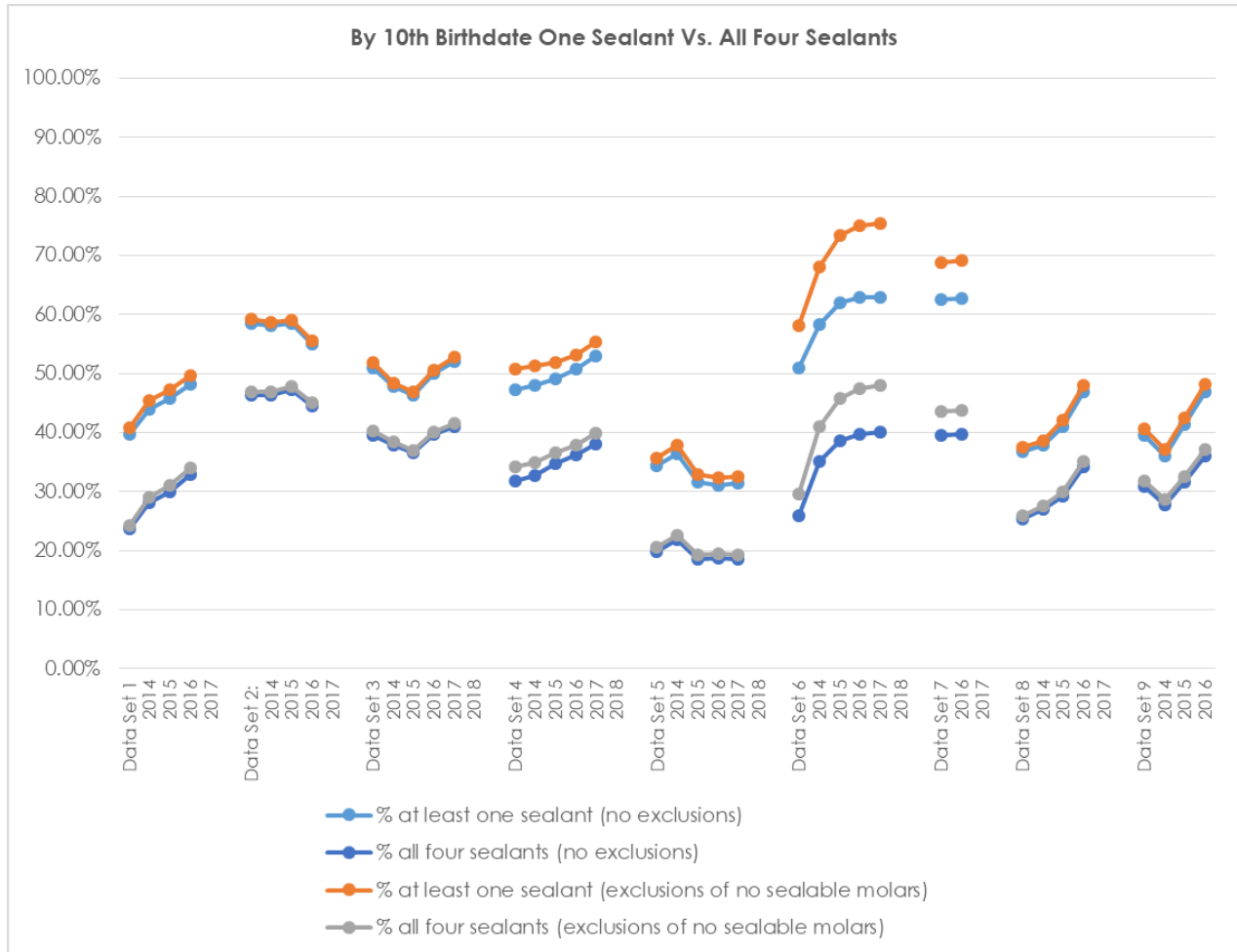
Data Set 8							
2014	35112	25.83%	0.0023	0.2537	0.2629		
2015	26395	27.61%	0.0028	0.2707	0.2815	24.52	<.0001
2016	32984	29.88%	0.0025	0.2939	0.3038	36.79	<.0001
2017	33313	35.01%	0.0026	0.3450	0.3553	199.12	<.0001
Data Set 9							
2014	15661	31.73%	0.0037	0.3101	0.3246		
2015	20799	28.59%	0.0031	0.2798	0.2921	42.05	<.0001
2016	20137	32.49%	0.0033	0.3185	0.3314	73.39	<.0001
2017	21078	37.12%	0.0033	0.3647	0.3777	97.09	<.0001

Table 6. Between Program Comparisons, 2017
Programs ranked from lowest to highest score

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
5	19.44%	0.0040	0.1865	0.2023
1	33.95%	0.0048	0.3302	0.3488
8	35.01%	0.0026	0.3450	0.3553
9	37.12%	0.0033	0.3647	0.3777
4	37.92%	0.0024	0.3745	0.3839
3	40.14%	0.0030	0.3956	0.4072
7	43.79%	0.0016	0.4348	0.4409
2	44.96%	0.0028	0.4441	0.4552
6	47.41%	0.0020	0.4702	0.4780

Figure 3 below depicts the compared measure scores with and without exclusions. When comparing trends over time, the effect of exclusions was more pronounced for some programs versus others.

Figure 3. Performance Scores for Sealants by 10th Birthdate With and Without Exclusions, 2014-2018



Critical Data Element Validity

The critical data elements needed to calculate the measure using the revised specifications are the same as the critical data elements that were validated during testing of the DQA's Pediatric Starter Set. Since critical data element validity—established by using dental records to examine the agreement between claims data and dental records and evaluate concordance by calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the Kappa statistic—has been documented earlier, the workgroup did not repeat these analyses.^{11,12}

¹¹ Herndon, J. B., Crall, J. J., Aravamudhan, K., et al. (2015). Developing and testing pediatric oral healthcare quality measures. *of Public Health Dentistry*, 75(3), 191-201

¹² Herndon, J. B., Tomar, S. L., Catalanotto, F. A., Rudner, N., Huang, I. C., Aravamudhan, K., ... & Crall, J. J. (2015). Measuring quality of dental care: Caries prevention services for children. *The Journal of the American Dental Association*, 146(8), 581-591.

Anchor Date and Enrollment Criteria

The workgroup had some initial concerns with the concept because the measure would focus on a single age year of children with their 10th Birthdate in the measurement year within the broad covered population, and the dental plans could potentially be incentivized to focus outreach efforts on only 10-year olds to count in the measure. However, the workgroup noted that similar measures exist within the CMS Core Set of Children's Health Care Quality Measures for Medicaid and CHIP (Child Core Set). For example, pediatric immunization measures used within the Child Core Set, HEDIS and CMS MIPS programs examine whether recommended immunizations are received by a certain age. For example:

Adolescent Immunizations: The percentage of adolescents 13 years of age who had the recommended immunizations by their 13th birthday

Child Core Set: <https://www.medicaid.gov/medicaid/quality-of-care/downloads/medicaid-and-chip-child-core-set-manual.pdf>

HEDIS: <https://www.ncqa.org/hedis/measures/immunizations-for-adolescents/>

CMS MIPS: http://healthmonix.com/mips_quality_measure/immunizations-for-adolescents-measure-394/

In reviewing the specifications for the adolescent immunization measure, the workgroup noted that the anchor date was tied to the child's birthdate and the enrollment interval was longer (12 months continuous enrollment with one allowable 45-day gap) compared with the sealant measure (age based on age at the end of the reporting year and 180 continuous days enrollment requirement). The workgroup compared the two approaches:

- 1) age tied to reporting year (child ≥ 9 and < 10 years on the last day of the reporting year) with 180 days continuous enrollment in reporting year [approach used for data presented above; aligns with most DQA measures], and
- 2) 12 months continuous enrollment with one allowable gap of up to 45 days immediately prior to 10th birthdate [new approach; aligns with pediatric immunization measures].

Data comparing the two anchor date and enrollment methodologies were available for 5 of the 9 programs. Figure 4 below depicts the time trends for the measure scores based on these two enrollment/anchor date criteria.

Figure 4. Performance Scores for Sealants by 10th Birthdate, 180 Days Enrollment and 12 months continuous enrollment with one 45-day gap, 2014–2018



Results for at least one permanent first molar sealed by the child’s 10th birthdate, using 12 months continuous enrollment with one allowable 45-day gap criteria

Table 7 illustrates the **within program comparisons**. The year-to-year differences in performance **were statistically significant for all years for programs 3, 4, and 5 based on chi-square tests**. There were statistically significant differences for all but one of the year-to-year comparisons for program 6.

Table 8 illustrates the **between program** comparisons for 2017. The measure scores ranged from 50% to 75%. The chi-square statistic for comparisons of all program measure scores (5x2 contingency table) was statistically significant ($X^2=6.36E+03$, $p<0.0001$). The measure score differences between pairs of programs **were statistically significant (at the p=0.05 level)** based on an evaluation of the confidence intervals.

Table 7. Performance Scores for At Least One Sealant Placement, 12 months continuous enrollment with one 45-day gap, and Year-to-Year Tests of Change

	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 3							
2014	19458	56.12%	0.0036	0.5542	0.5682		
2015	20160	54.37%	0.0035	0.5368	0.5505	12.34	0.0004
2016	21763	52.19%	0.0034	0.5153	0.5285	19.90	<.0001
2017	23974	50.21%	0.0032	0.4958	0.5085	17.84	<.0001
2018	24243	53.64%	0.0032	0.5301	0.5426	56.59	<.0001
Data Set 4							
2015	31652	52.79%	0.0028	0.5224	0.5334		
2016	36679	55.11%	0.0026	0.5460	0.5561	36.67	<.0001
2017	37604	56.95%	0.0026	0.5645	0.5745	25.54	<.0001

2018	35917	58.56%	0.0026	0.5805	0.5907	19.54	<.0001
Data Set 5							
2014	2921	49.09%	0.0092	0.4728	0.5091		
2015	3097	56.86%	0.0089	0.5512	0.5861	36.43	<.0001
2016	3403	61.89%	0.0083	0.6025	0.6352	16.99	<.0001
2017	3430	67.17%	0.0080	0.6560	0.6874	20.85	<.0001
2018	3246	70.98%	0.0080	0.6942	0.7254	11.31	0.0008
Data Set 6							
2014	34670	52.26%	0.0027	0.5173	0.5278		
2015	39060	64.57%	0.0024	0.6409	0.6504	1148.52	<.0001
2016	44167	72.46%	0.0021	0.7204	0.7287	600.58	<.0001
2017	44305	74.72%	0.0021	0.7432	0.7513	58.33	<.0001
2018	42278	75.14%	0.0021	0.7473	0.7555	2.01	0.1563
Data Set 7							
2016	63023	70.98%	0.0018	0.7062	0.7133		
2017	63388	71.37%	0.0018	0.7101	0.7172	2.32	0.1277

Table 8. Between Program Comparisons, 2017
Programs ranked from lowest to highest score

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
3	50.21%	0.0032	0.4958	0.5085
4	56.95%	0.0026	0.5645	0.5745
5	67.17%	0.0080	0.6560	0.6874
7	71.37%	0.0018	0.7101	0.7172
6	74.72%	0.0021	0.7432	0.7513

Results for ALL four molars sealed by the 10th birthdate, using 12 months continuous enrollment with one allowable 45-day gap criteria

Table 9 illustrates the **within program comparisons**. The year-to-year differences in performance **were statistically significant for all years for programs 4, 5 and 6 based on chi-square tests**. There were statistically significant differences for all but one of the year-to-year comparisons for program 3.

Table 10 illustrates the **between program** comparisons for 2017. The measure scores ranged from 40% to 51%. The chi-square statistic for comparisons of all program measure scores (5x2 contingency table) was statistically significant ($X^2=1.18E+03$, $p<0.0001$). The measure score differences between pairs of programs **were statistically significant (at the p=0.05 level)** based on an evaluation of the confidence intervals.

Table 9. Performance Scores for All 4 Molars Sealed by the 10th Birthdate, 12 months continuous enrollment with one 45-day gap, and Year-to-Year Tests of Change

	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 3							
2014	19458	44.51%	0.0036	0.4381	0.4521		
2015	20160	42.33%	0.0035	0.4165	0.4301	19.15	<.0001
2016	21763	41.63%	0.0033	0.4098	0.4229	2.11	0.1463
2017	23974	39.59%	0.0032	0.3897	0.4021	19.72	<.0001
2018	24243	42.87%	0.0032	0.4225	0.4350	53.69	<.0001
Data Set 4							
2015	31652	36.03%	0.0027	0.3550	0.3656		
2016	36679	38.49%	0.0025	0.3799	0.3898	43.80	<.0001
2017	37604	40.91%	0.0025	0.4042	0.4141	45.72	<.0001
2018	35917	42.56%	0.0026	0.4205	0.4307	20.54	<.0001
Data Set 5							
2014	2921	25.61%	0.0081	0.2402	0.2719		
2015	3097	35.23%	0.0086	0.3355	0.3691	65.56	<.0001
2016	3403	40.96%	0.0084	0.3931	0.4262	22.59	<.0001
2017	3430	44.58%	0.0085	0.4291	0.4624	9.11	0.0025
2018	3246	50.86%	0.0088	0.4914	0.5258	26.16	<.0001
Data Set 6							
2014	34670	22.31%	0.0022	0.2187	0.2275		
2015	39060	36.36%	0.0024	0.3588	0.3684	1733.76	<.0001
2016	44167	47.22%	0.0024	0.4676	0.4769	1003.01	<.0001
2017	44305	50.64%	0.0024	0.5017	0.5111	103.47	<.0001
2018	42278	51.85%	0.0024	0.5138	0.5233	12.77	0.0004
Data Set 7							
2016	63023	46.60%	0.0020	0.4621	0.4699		
2017	63388	46.86%	0.0020	0.4647	0.4725	0.87	0.3510

Table 10. Between Program Comparisons, 2017
Programs ranked from lowest to highest score

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
3	39.59%	0.0032	0.3897	0.4021
4	40.91%	0.0025	0.4042	0.4141
5	44.58%	0.0085	0.4291	0.4624
7	46.86%	0.0020	0.4647	0.4725
6	50.64%	0.0024	0.5017	0.5111

Conceptually, continuous enrollment criteria establish the uniform time interval for the measured entity (plan/program) to impact each child in the denominator. However, for this measure, since children are counted in the numerator from any point of time in the 48 months prior to the 10th birthdate and regardless of by whom the sealant was placed, continuous enrollment criteria have less of an impact other than from the perspective of having a more complete claims history.

Availability of claims data is critical to compute the measure, both for exclusions of treatments from the denominator as well as inclusion of sealants in the numerator. The program will not have complete claims history for children who churn in and out of the program due to the inability to observe treatment rendered during the periods when they are not enrolled in the program. From this perspective the 12-month enrollment requirement (allowing for up to a single 45-day gap) prior to the child's 10th birthdate may help by ensuring at least one year of treatment history. It also allows a greater time span for the program/plan to ensure that enrolled children are connected to the provider to receive sealants. Lastly, this methodology aligns with the Child Core Set immunization measures.

However, the 12-month enrollment criterion may result in a significantly reduced population that is eligible for inclusion in the denominator in programs with shorter enrollment durations (greater "churn") and, therefore, may be less representative of the population that is the focus of measurement. Consensus of the workgroup was to use the 12-month enrollment criterion (allowing for up to a single 45-day gap) because it would allow the program/plan at least a full year to impact provision of sealants to children who may not have already obtained sealants.

Workgroup Recommendations

Workgroup Observations & Recommendations: The workgroup found the "by 10th Birthdate" measure to be feasible, reliable and valid. The measure is able to detect differences in performance scores within a program over time and between programs. Critical data elements needed for computation of the measure are typically available within administrative claims databases and have previously been established as meeting data element reliability and validity standards through chart reviews. Reliability of measure computation can be further assured with clear and detailed standardized specifications. The rate for "all four" molars sealed would be an appropriate proxy indicator of population health because it signifies that the children do not have disease in the permanent first molars among those who received at least one sealant. The workgroup acknowledged that some programs may be interested in understanding the sealant placement rates specific to populations at elevated caries risk and noted that the denominator may be stratified by risk status to glean this information.

The measure will have the following limitations:

(1) Claims data cannot identify (a) teeth with active decay, (b) sealants not billed to the program/plan, or (c) teeth restored/extracted not billed to the program/plan thus impacting the precision of both the numerator and denominator.

(2) Comparisons would be biased **if** programs being compared have significant differences in enrollment duration resulting in differences in the availability of complete treatment history for enrollees (due to not having claims data for treatment rendered outside of program enrollment) to consistently identify children who should be included in the numerator and excluded from the denominator. However, this is not unique to dental measures.

(3) The 11-12 month enrollment criterion may result in a significantly reduced population that is eligible for inclusion in the denominator in programs with shorter enrollment durations (greater “churn”) and, therefore, may be less representative of the population that is the focus of measurement.

Consensus of the workgroup was to proceed with the measure based on administrative claims despite the noted limitations due to the need to continue to measure and improve sealant rates.

The workgroup agreed that the measure as defined would be a clinical quality process measure that can be used for performance improvement and accountability applications at the program and plan levels.

Recommended measure: Of those enrolled in a program/plan how many children have ever received (1) at least one sealant and (2) four sealants on permanent first molars by the child's 10th Birthdate, excluding children who have had all four molars otherwise treated (e.g., restored or extracted).

NOTE: The workgroup did not document the following ancillary aspects of the new measure:

- Ability to detect disparities
- Extent of missing and invalid data within datasets used to calculate the measure

If the measure is adopted and a future NQF submission is considered, the workgroup recommends that the above properties be documented.

DQA Approval

The DQA reviewed the testing data for the new measure concept and the workgroup recommendations at its June 2019 meeting. The membership voted to approve the new measure of sealant receipt on permanent first molars by the 10th birthdate. The DQA also charged the MDMC with undertaking testing of a counterpart measure of sealant receipt on permanent second molars.

[Appendix 4](#) has the complete specifications for Sealant Receipt on Permanent First Molars.

Sealants on Permanent Second Molars

Subsequent to approval of the measure concept by the DQA at its June 2019 meeting, the MDMC evaluated the concept: of those children enrolled in a program/plan, how many have ever received (1) at least one sealant and (2) four sealants on permanent second molars by the child's index birthdate. The MDMC evaluated alternative index birthdates, including the 13th, 14th, and 15th birthdates. The following data partners provided data for this evaluation:

1. Delta Dental of Wisconsin (commercial)
2. DentaQuest Florida Medicaid
3. Dentaquest Massachusetts (commercial)
4. DentaQuest New York Medicaid
5. DentaQuest Texas Medicaid
6. MCNA Louisiana Medicaid
7. MCNA Texas CHIP
8. MCNA Texas Medicaid
9. Oregon Medicaid Program

Conceptually, sealant receipt on permanent second molars is similar to that of sealant receipt on permanent first molars. The main differences are in the specification of the tooth numbers (permanent second molars instead of permanent first molars) and the age by which sealant placement should occur. Consequently, the MDMC's evaluation focused on (1) determining the index age and (2) validating the measure's ability to detect differences in performance over time and between programs.

Evaluation 1: Age Determination

Given the variation in eruption pattern for permanent second molars, the MDMC evaluated the impact of the measure for three different index ages:

1. by the 13th birthdate,
2. by the 14th birthdate, and
3. by the 15th birthdate.

Figures 5 and 6 illustrate the measure scores by age with and without exclusions. The effect of exclusions was more pronounced for some programs versus others. The complete raw data are provided in [Appendix 3](#).

MDMC Observations and Determinations. The MDMC noted that selecting an index age below the 15th birthdate would miss a considerable number of children. Consequently, it determined that the measure should focus on sealant place by the 15th birthdate. The measure incorporates a 48-month look back period to identify sealant placement prior to the 15th birthdate. Thus, the measure would capture sealants placed during ages 11 years through 14 years (if reflected in available claims).

Figure 5. Performance Scores for At Least One Sealant on Permanent Second Molars by 13th, 14th and 15th Birthdates, With and Without Exclusions, 2014–2018

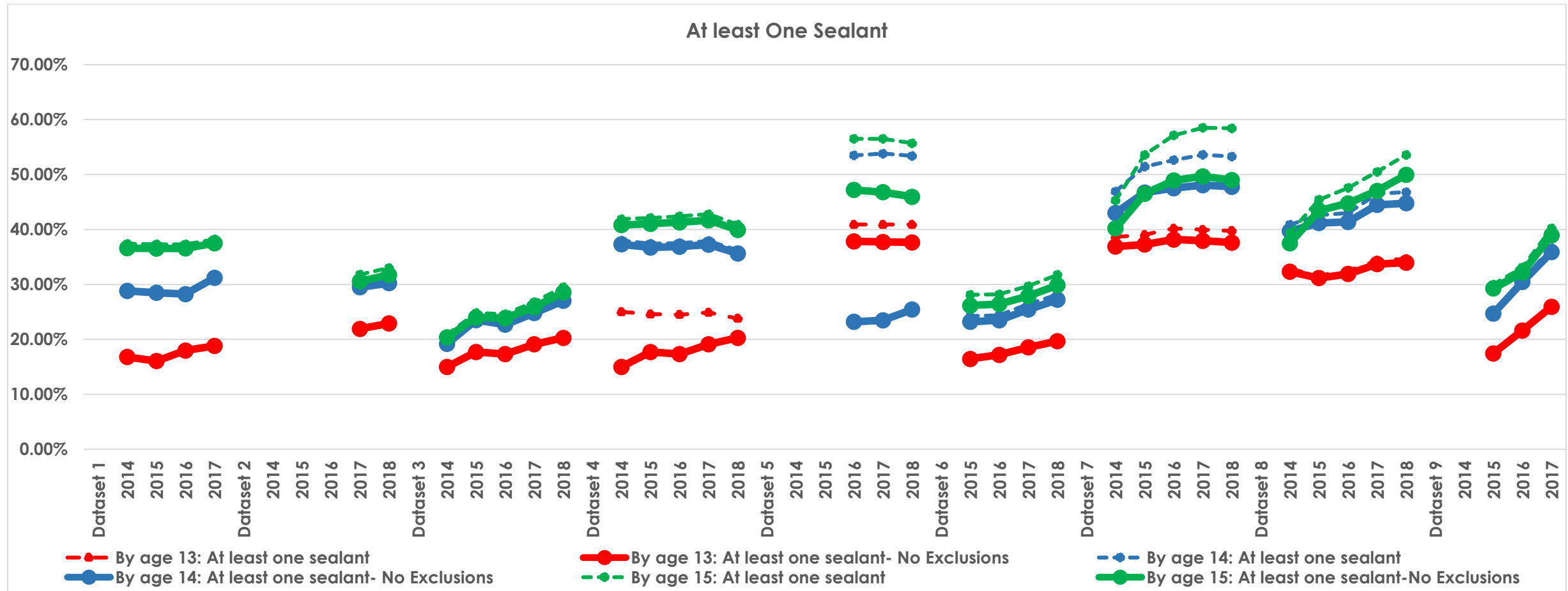
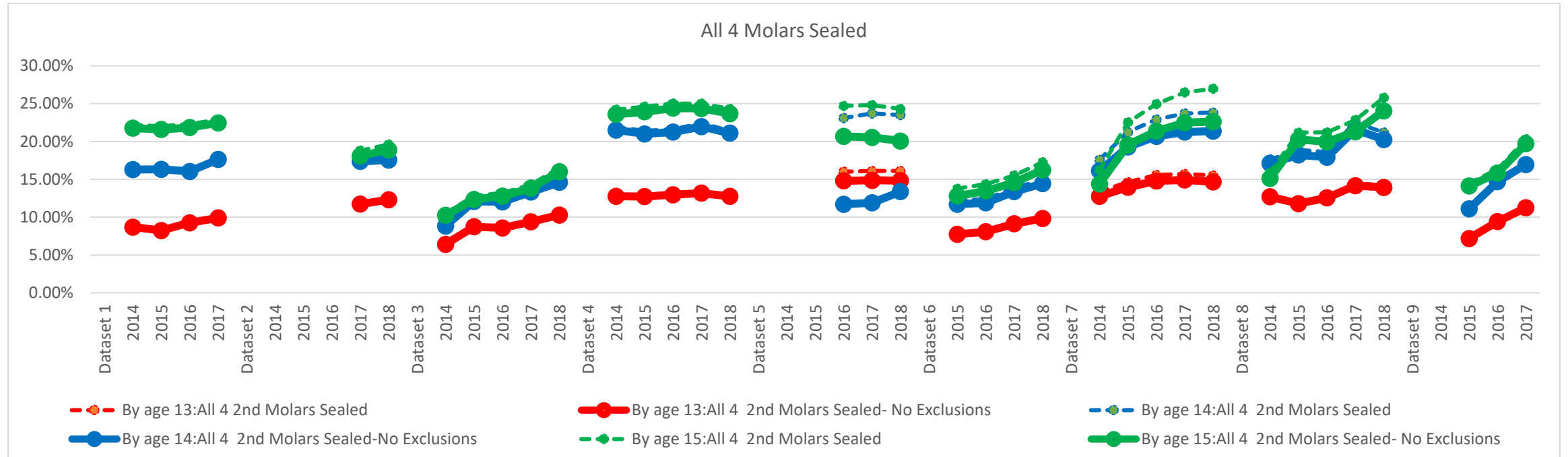


Figure 6. Performance Scores for All Four Permanent Second Molars Sealed by 13th, 14th and 15th Birthdates, With and Without Exclusions, 2014–2018



Evaluation 2: Validation of Sealant Receipt on Permanent Second Molars by the Child's 15th Birthdate

Measure Testing

Specification Reliability

Detailed specifications were made available to all data partners. Questions that arose during measure programming were used to improve the clarity of the specifications.

Ability to Detect Differences

Appendix 3 includes the data as reported by the data partners. The MDMC evaluated the measure's ability to detect performance changes **within** the program over time and **between** programs.

The measure scores represent sealant receipt among children by their 15th birthdate with exclusions for prior treatment history on all four permanent second molars. The measure has two reported rates: (1) children who received at least one sealant on a permanent second molar and (2) children who received sealants on all four permanent second molars.

The measure scores were calculated and reported with their 95% confidence intervals and standard deviations. Comparisons of the 95% confidence intervals and chi-square tests were used to evaluate whether the measures detected variations in performance: (1) between years within a program (Tables 11 and 13) and (2) between programs (Tables 12 and 14). The following summaries provide the results of this evaluation.

Results for at least one permanent second molar sealed by the child's 15th birthdate

Table 11 illustrates the **within program comparisons**. The year-to-year differences in performance were statistically significant for all years reported for programs 2 and 9 based on chi-square tests. There were statistically significant differences for all but one of the year-to-year comparisons for programs 3, 5, 6, 7 and 8, and one of the year-to-year comparisons for programs 1 and 4 were statistically significant.

Table 12 illustrates the **between program** comparisons for 2017. The measure scores ranged from 27% to 59%. The chi-square statistic for comparisons of all program measure scores (9x2 contingency table) was statistically significant ($X^2=1.47E+04$, $p<0.0001$). The measure score differences between pairs of programs were statistically significant (at the $p=0.05$ level) for all comparisons based on an evaluation of the confidence intervals.

Table 11. Performance Scores for At Least One Sealant Placement by the 15th Birthdate and Year-to-Year Tests of Change

	Denomi- nator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 1							
2014	22,789	37.40%	0.0032	0.3677	0.3803		
2015	23,574	37.30%	0.0031	0.3668	0.3792	0.05	0.8231
2016	24,318	37.30%	0.0031	0.3669	0.3791	0.00	1.0000
2017	26,884	38.20%	0.0030	0.3762	0.3878	4.31	0.0379
Data Set 2							
2017	41,056	31.80%	0.0023	0.3135	0.3225		
2018	43,170	33.00%	0.0023	0.3256	0.3344	13.36	0.0003
Data Set 3							
2014	18,856	20.90%	0.0030	0.2032	0.2148		
2015	11,742	24.80%	0.0040	0.2402	0.2558	64.47	<.0001
2016	16,906	24.60%	0.0033	0.2395	0.2525	0.12	0.7290
2017	20,730	26.80%	0.0031	0.2620	0.2740	21.56	<.0001
2018	19,061	29.50%	0.0033	0.2885	0.3015	37.24	<.0001
Data Set 4							
2014	27,480	41.90%	0.0030	0.4132	0.4248		
2015	27,541	42.10%	0.0030	0.4152	0.4268	0.33	0.5657
2016	27,167	42.40%	0.0030	0.4181	0.4299	0.35	0.5541
2017	26,869	42.80%	0.0030	0.4221	0.4339	0.74	0.3897
2018	27,319	40.90%	0.0030	0.4032	0.4148	19.21	<.0001
Data Set 5							
2016	49,654	56.50%	0.0022	0.5606	0.5694		
2017	51,999	56.50%	0.0022	0.5607	0.5693	0.02	0.8875
2018	54,223	55.70%	0.0021	0.5528	0.5612	6.98	0.0082
Data Set 6							
2015	21,203	28.12%	0.0031	0.2751	0.2873		
2016	33,526	28.21%	0.0025	0.2773	0.2869	0.05	0.8231
2017	32,942	29.70%	0.0025	0.2921	0.3019	18.00	<.0001
2018	31,360	31.76%	0.0026	0.3124	0.3228	31.83	<.0001
Data Set 7							

2014	24,097	45.26%	0.0032	0.4463	0.4589		
2015	34,441	53.58%	0.0027	0.5305	0.5411	392.28	<.0001
2016	37,067	57.14%	0.0026	0.5664	0.5764	91.93	<.0001
2017	37,943	58.52%	0.0025	0.5802	0.5902	14.52	0.0001
2018	37,350	58.43%	0.0026	0.5793	0.5893	0.05	0.8231
Data Set 8							
2014	1,768	39.42%	0.0116	0.3714	0.4170		
2015	3,429	45.41%	0.0085	0.4374	0.4708	17.14	<.0001
2016	3,052	47.58%	0.0090	0.4581	0.4935	3.05	0.0807
2017	3,074	50.49%	0.0090	0.4872	0.5226	5.20	0.0226
2018	3,299	53.56%	0.0087	0.5186	0.5526	6.02	0.0141
Data Set 9							
2015	14,337	30.00%	0.0038	0.2925	0.3075		
2016	12,757	33.10%	0.0042	0.3228	0.3392	29.05	<.0001
2017	11,526	40.20%	0.0046	0.3930	0.4110	131.12	<.0001

Table 12. Between Program Comparisons for At Least One Sealant Placement by 15th Birthdate, Programs ranked from lowest to highest score, 2017

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
3	26.80%	0.0031	0.2620	0.2740
6	29.70%	0.0025	0.2921	0.3019
2	33.00%	0.0023	0.3256	0.3344
1	38.20%	0.0030	0.3762	0.3878
9	40.20%	0.0046	0.3930	0.4110
4	42.80%	0.0030	0.4221	0.4339
8	50.49%	0.0090	0.4872	0.5226
5	56.50%	0.0022	0.5607	0.5693
7	58.52%	0.0025	0.5802	0.5902

Results for ALL 4 molars sealed by the child's 15th birthdate

Table 13 illustrates the **within program comparisons**. The year-to-year differences in performance were statistically significant for all years reported for programs 2 and 9 based on chi-square tests. There were statistically significant differences for some of the year-to-year comparisons for programs 3, 6, and 7, and two of the year-to-year comparisons for program 8 were statistically significant. Three programs (1, 4, and 5) did not demonstrate statistically significant differences in the year-to-year comparisons.

Table 14 illustrates the **between program** comparisons for 2017. The measure scores ranged from 14% to 26%. The chi-square statistic for comparisons of all program measure scores (9x2 contingency table) was statistically significant ($X^2=2.63E+03$, $p<0.0001$). The measure score differences between pairs of programs were statistically significant (at the $p=0.05$ level) except

for the scores between programs 4 and 5 based both on an evaluation of the confidence intervals and chi-square tests. Non-overlapping confidence intervals can be used to infer a statistically significant difference. However, there may be statistically significant differences when confidence intervals exhibit a small amount of overlap. In those cases, chi-square tests were used to evaluate between-program differences.

Table 13. Performance Scores for All 4 Molars Sealed by the 15th Birthdate and Year-to-Year Tests of Change

	Denominator	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI	Chi-Square Test of Within Program Year-to-Year Changes	
Data Set 1							
2014	22,789	22.20%	0.0028	0.2166	0.2274		
2015	23,574	22.00%	0.0027	0.2147	0.2253	0.36	0.5485
2016	24,318	22.30%	0.0027	0.2178	0.2282	0.55	0.4583
2017	26,884	22.90%	0.0026	0.2240	0.2340	2.46	0.1168
Data Set 2							
2017	41,056	18.80%	0.0019	0.1842	0.1918		
2018	43,170	19.60%	0.0019	0.1923	0.1997	8.68	0.0032
Data Set 3							
2014	18,856	10.50%	0.0022	0.1006	0.1094		
2015	11,742	12.80%	0.0031	0.1220	0.1340	36.23	<.0001
2016	16,906	13.20%	0.0026	0.1269	0.1371	1.28	0.2579
2017	20,730	14.30%	0.0024	0.1382	0.1478	9.35	0.0022
2018	19,061	16.50%	0.0027	0.1597	0.1703	38.08	<.0001
Data Set 4							
2014	27,480	24.20%	0.0026	0.2369	0.2471		
2015	27,541	24.60%	0.0026	0.2409	0.2511	0.89	0.3455
2016	27,167	25.00%	0.0026	0.2449	0.2551	1.75	0.1859
2017	26,869	25.00%	0.0026	0.2448	0.2552	0.02	0.8875
2018	27,319	24.30%	0.0026	0.2379	0.2481	3.81	0.0509
Data Set 5							
2016	49,654	24.70%	0.0019	0.2432	0.2508		
2017	51,999	24.80%	0.0019	0.2443	0.2517	0.10	0.7518
2018	54,223	24.30%	0.0018	0.2394	0.2466	3.47	0.0625
Data Set 6							
2015	21,203	13.77%	0.0024	0.1331	0.1423		

2016	33,526	14.37%	0.0019	0.1399	0.1475	3.80	0.0513
2017	32,942	15.52%	0.0020	0.1513	0.1591	17.30	<.0001
2018	31,360	17.27%	0.0021	0.1685	0.1769	35.90	<.0001
Data Set 7							
2014	24,097	16.20%	0.0024	0.1573	0.1667		
2015	34,441	22.53%	0.0023	0.2209	0.2297	356.55	<.0001
2016	37,067	24.94%	0.0022	0.2450	0.2538	57.34	<.0001
2017	37,943	26.48%	0.0023	0.2604	0.2692	23.29	<.0001
2018	37,350	26.97%	0.0023	0.2652	0.2742	2.31	0.1285
Data Set 8							
2014	1,768	15.89%	0.0087	0.1419	0.1759		
2015	3,429	21.17%	0.0070	0.1980	0.2254	20.81	<.0001
2016	3,052	21.20%	0.0074	0.1975	0.2265	0.00	1.0000
2017	3,074	22.84%	0.0076	0.2136	0.2432	2.62	0.1055
2018	3,299	25.77%	0.0076	0.2428	0.2726	7.41	0.0065
Data Set 9							
2015	14,337	14.50%	0.0029	0.1392	0.1508		
2016	12,757	16.30%	0.0033	0.1566	0.1694	16.48	<.0001
2017	11,526	20.30%	0.0037	0.1957	0.2103	66.05	<.0001

Table 14. Between Program Comparisons for All 4 Molars Sealed by the 15th Birthdate, Programs ranked from lowest to highest score, 2017

Data Set	Measure Score	Standard Deviation	Lower Bound, 95% CI	Upper Bound, 95% CI
3	14.30%	0.0024	0.1382	0.1478
6	15.52%	0.0020	0.1513	0.1591
2	19.60%	0.0019	0.1923	0.1997
9	20.30%	0.0037	0.1957	0.2103
8	22.84%	0.0076	0.2136	0.2432
1	22.90%	0.0026	0.2240	0.2340
5	24.80%	0.0019	0.2443	0.2517
4	25.00%	0.0026	0.2448	0.2552
7	26.48%	0.0023	0.2604	0.2692

MDMC Observations and Determinations. Based on the data from the 9 testing partners, the MDMC determined that the proposed measure can detect differences in performance between programs and over time. Therefore, the MDMC recommends the measure **Sealant Receipt on Permanent Second Molars**: Of those enrolled in a program/plan how many children have ever received (1) at least one sealant and (2) four sealants on permanent second molars by the child's 15th birthdate, excluding children who have had all four molars otherwise treated (e.g., restored or extracted). [Appendix 5](#) has the complete specifications for Sealant Receipt on Permanent Second Molars.

NOTE: The MDMC did not document the following ancillary aspects of the new measure:

- Ability to detect disparities
- Extent of missing and invalid data within datasets used to calculate the measure

If the measure is adopted and a future NQF submission is considered, the workgroup recommends that the above properties be documented.

APPENDIX 1: Annual Placement of Sealants, Permanent 1st Molar

Data As Provided*

*Some plans may not have de-duplicated between exclusions; however, this does not impact measure rates since DEN was reported separately.

Data Set 1:

		Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	24,537	381	4,517	19,639	3,102	15.8%
	7 (>=7 and <8)	8,697	56	766	7,875	1,304	16.6%
	8 (>=8 and <9)	8,159	134	1,695	6,330	1,087	17.2%
	9 (>=9 and <10)	7,681	191	2,056	5,434	711	13.1%
2015	Total	27,667	519	5,710	21,438	3,749	17.5%
	7 (>=7 and <8)	9,409	61	842	8,506	1,520	17.9%
	8 (>=8 and <9)	9,419	179	2,117	7,123	1,365	19.2%
	9 (>=9 and <10)	8,839	279	2,751	5,809	864	14.9%
2016	Total	29,651	576	6,434	22,641	4,394	19.4%
	7 (>=7 and <8)	9,807	89	864	8,854	1,779	20.1%
	8 (>=8 and <9)	9,932	170	2,330	7,432	1,568	21.1%
	9 (>=9 and <10)	9,912	317	3,240	6,355	1,047	16.5%
2017	Total	30,284	614	6,887	22,793	4,772	20.9%
	7 (>=7 and <8)	10,006	100	895	9,011	1,945	21.6%
	8 (>=8 and <9)	10,054	216	2,441	7,397	1,663	22.5%
	9 (>=9 and <10)	10,224	298	3,541	6,385	1,164	18.2%

Data Set 2:

		Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	87,994	699	26,939	60,459	16,668	27.6%
	7 (>=7 and <8)	28,660	103	3,204	25,360	7,243	28.6%
	8 (>=8 and <9)	29,319	237	9,492	19,616	6,178	31.5%
	9 (>=9 and <10)	30,015	359	14,243	15,483	3,247	21.0%
2015	Total	86,911	657	26,310	60,035	16,800	28.0%
	7 (>=7 and <8)	28,151	92	3,079	24,985	7,250	29.0%
	8 (>=8 and <9)	29,145	222	9,373	19,581	6,308	32.2%
	9 (>=9 and <10)	29,615	343	13,858	15,469	3,242	21.0%
2016	Total	85,613	633	26,163	58,908	16,421	27.9%
	7 (>=7 and <8)	27,294	112	2,944	24,242	7,053	29.1%
	8 (>=8 and <9)	28,759	184	9,331	19,258	6,070	31.5%
	9 (>=9 and <10)	29,560	337	13,888	15,408	3,298	21.4%
2017	Total	89,850	624	25,607	63,698	16,825	26.4%
	7 (>=7 and <8)	28,712	100	2,911	25,709	7,085	27.6%
	8 (>=8 and <9)	29,787	222	9,027	20,564	6,283	30.6%
	9 (>=9 and <10)	31,351	302	13,669	17,425	3,457	19.8%

Data Set 3:

	Age	Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
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		in the reporting year)						
2014	Total	68,837	687	19,147	49,091	12,292	25.0%	
	7 (>=7 and <8)	22,293	97	2,422	19,778	5,630	28.5%	
	8 (>=8 and <9)	22,997	216	6,993	15,815	4,399	27.8%	
	9 (>=9 and <10)	23,547	374	9,732	13,498	2,263	16.8%	
2015	Total	76,118	712	19,425	56,085	13,840	24.7%	
	7 (>=7 and <8)	24,237	100	2,434	21,708	6,197	28.5%	
	8 (>=8 and <9)	25,523	242	7,042	18,267	5,014	27.4%	
	9 (>=9 and <10)	26,358	370	9,949	16,110	2,629	16.3%	
2016	Total	80,644	679	20,311	59,735	14,926	25.0%	
	7 (>=7 and <8)	25,877	148	2,693	23,046	6,864	29.8%	
	8 (>=8 and <9)	26,709	200	7,356	19,174	5,316	27.7%	
	9 (>=9 and <10)	28,058	331	10,262	17,515	2,746	15.7%	
2017	Total	80,224	687	22,375	57,243	14,690	25.7%	
	7 (>=7 and <8)	25,405	98	2,806	22,504	6,710	29.8%	
	8 (>=8 and <9)	27,024	275	8,472	18,307	5,201	28.4%	
	9 (>=9 and <10)	27,795	314	11,097	16,432	2,779	16.9%	
2018	Total	81,840	728	23,548	57,661	14,580	25.3%	
	7 (>=7 and <8)	26,194	112	2,834	23,250	6,685	28.8%	
	8 (>=8 and <9)	26,904	220	8,491	18,221	5,183	28.4%	
	9 (>=9 and <10)	28,742	396	12,223	16,190	2,712	16.8%	

Data Set 4:

	Age	Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	125,565	5,259	32,919	88,303	16,585	18.78%
	7 (>=7 and <8)	44,096	741	5,159	38,270	7,896	20.63%
	8 (>=8 and <9)	42,201	1,864	12,182	28,474	5,711	20.06%
	9 (>=9 and <10)	39,268	2,654	15,578	21,559	2,978	13.81%
2015	Total	135,781	5,013	35,643	96,036	17,359	18.08%
	7 (>=7 and <8)	46,035	626	4,918	40,541	8,012	19.76%
	8 (>=8 and <9)	45,848	1,563	13,071	31,459	5,998	19.07%
	9 (>=9 and <10)	43,898	2,824	17,654	24,036	3,349	13.93%
2016	Total	133,482	4,125	35,154	94,898	19,513	20.56%
	7 (>=7 and <8)	43,591	519	4,677	38,429	8,536	22.21%
	8 (>=8 and <9)	44,939	1,310	12,487	31,337	6,886	21.97%
	9 (>=9 and <10)	44,952	2,296	17,990	25,132	4,091	16.28%
2017	Total	126,614	3,679	36,331	87,214	18,047	20.69%
	7 (>=7 and <8)	40,243	475	5,182	34,639	7,749	22.37%
	8 (>=8 and <9)	42,589	1,178	12,807	28,766	6,447	22.41%
	9 (>=9 and <10)	43,782	2,026	18,342	23,809	3,851	16.17%
2018	Total	118,859	3,203	35,210	81,048	16,915	20.87%
	7 (>=7 and <8)	38,642	393	4,567	33,711	7,472	22.16%
	8 (>=8 and <9)	39,097	966	12,468	25,845	5,893	22.80%
	9 (>=9 and <10)	41,120	1,844	18,175	21,492	3,550	16.52%

Data Set 5:

	Age	Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	43,251	1,041	7,070	35,300	7,025	19.90%
	7 (>=7 and <8)	14,118	180	927	13,027	2,937	22.55%
	8 (>=8 and <9)	14,779	357	2,759	11,709	2,535	21.65%
	9 (>=9 and <10)	14,354	504	3,384	10,564	1,553	14.70%
2015	Total	30,677	739	5,093	24,985	5,087	20.36%
	7 (>=7 and <8)	10,193	112	630	9,457	2,224	23.52%
	8 (>=8 and <9)	10,276	252	1,836	8,230	1,772	21.53%
	9 (>=9 and <10)	10,208	375	2,627	7,298	1,091	14.95%
2016	Total	31,453	759	4,675	26,144	5,242	20.05%
	7 (>=7 and <8)	10,498	133	686	9,689	2,369	24.45%
	8 (>=8 and <9)	10,459	254	1,741	8,511	1,799	21.14%
	9 (>=9 and <10)	10,496	372	2,248	7,944	1,074	13.52%
2017	Total	28,421	748	4,391	23,395	4,683	20.02%
	7 (>=7 and <8)	8,577	101	618	7,861	1,953	24.84%
	8 (>=8 and <9)	9,844	268	1,735	7,884	1,656	21.00%
	9 (>=9 and <10)	10,000	379	2,038	7,650	1,074	14.04%
2018	Total	25,909	657	4,102	21,273	4,139	19.46%
	7 (>=7 and <8)	7,937	114	551	7,283	1,741	23.90%
	8 (>=8 and <9)	8,338	186	1,505	6,671	1,425	21.36%
	9 (>=9 and <10)	9,634	357	2,046	7,319	973	13.29%

Data Set 6:

	Age	Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	210,910	17,640	62,213	136,475	41,166	30.16%
	7 (>=7 and <8)	76,455	3,439	12,054	61,743	20,699	33.52%
	8 (>=8 and <9)	72,968	6,679	25,733	42,621	13,642	32.01%
	9 (>=9 and <10)	61,487	7,522	24,426	32,111	6,825	21.25%
2015	Total	239,144	22,974	81,372	142,856	44,950	31.47%
	7 (>=7 and <8)	81,714	3,867	13,843	64,911	22,266	34.30%
	8 (>=8 and <9)	80,182	7,984	30,579	44,446	14,788	33.27%
	9 (>=9 and <10)	77,248	11,123	36,950	33,499	7,896	23.57%
2016	Total	236,306	24,338	86,699	134,575	42,856	31.85%
	7 (>=7 and <8)	79,448	4,035	13,696	62,685	21,305	33.99%
	8 (>=8 and <9)	78,917	8,171	32,290	41,545	14,132	34.02%
	9 (>=9 and <10)	77,941	12,132	40,713	30,345	7,419	24.45%
2017	Total	213,373	23,461	82,664	116,540	36,279	31.13%
	7 (>=7 and <8)	62,277	3,063	10,735	49,228	16,504	33.53%
	8 (>=8 and <9)	75,463	8,175	31,092	39,298	13,117	33.38%
	9 (>=9 and <10)	75,633	12,223	40,837	28,014	6,658	23.77%
2018	Total	180,949	20,757	71,762	96,874	29,601	30.56%
	7 (>=7 and <8)	49,352	2,532	8,774	38,737	13,154	33.96%
	8 (>=8 and <9)	59,798	6,302	24,120	31,769	10,260	32.30%
	9 (>=9 and <10)	71,799	11,923	38,868	26,368	6,187	23.46%

Data Set 7:

		Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	306,366					
	7 (>=7 and <8)	103,458					
	8 (>=8 and <9)	100,519					
	9 (>=9 and <10)	102,389					
2015	Total	313,746					
	7 (>=7 and <8)	105,563					
	8 (>=8 and <9)	105,690					
	9 (>=9 and <10)	102,493					
2016	Total	324,248	21,170	120,166	183,158	59,035	32.2%
	7 (>=7 and <8)	107,410	4,145	18,509	84,763	29,468	34.8%
	8 (>=8 and <9)	108,421	7,152	44,283	57,084	19,400	34.0%
	9 (>=9 and <10)	108,417	9,873	57,374	41,311	10,167	24.6%
2017	Total	336,097	21,833	123,292	191,226	61,508	32.2%
	7 (>=7 and <8)	117,152	4,315	20,005	92,841	32,091	34.6%
	8 (>=8 and <9)	108,936	7,406	44,716	56,845	19,144	33.7%
	9 (>=9 and <10)	110,009	10,112	58,571	41,540	10,273	24.7%

Data Set 8:

		Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
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2014	Total	112,862	1,459	20,712	90,902	14,100	15.5%
	7 (>=7 and <8)	39,108	188	3,189	35,745	5,480	15.3%
	8 (>=8 and <9)	37,853	482	7,820	29,619	5,163	17.4%
	9 (>=9 and <10)	35,901	789	9,703	25,538	3,457	13.5%
2015	Total	81,678	1,189	13,570	67,143	13,551	20.2%
	7 (>=7 and <8)	26,987	161	1,894	24,959	5,039	20.2%
	8 (>=8 and <9)	27,680	412	5,034	22,307	4,984	22.3%
	9 (>=9 and <10)	27,011	616	6,642	19,877	3,528	17.7%
2016	Total	99,870	1,465	18,339	80,326	17,918	22.3%
	7 (>=7 and <8)	32,696	196	2,487	30,028	6,857	22.8%
	8 (>=8 and <9)	33,386	465	6,565	26,436	6,553	24.8%
	9 (>=9 and <10)	33,788	804	9,287	23,862	4,508	18.9%
2017	Total	100,068	1,448	23,654	75,277	17,291	23.0%
	7 (>=7 and <8)	32,634	177	3,362	29,117	6,820	23.4%
	8 (>=8 and <9)	33,306	456	8,527	24,417	6,317	25.9%
	9 (>=9 and <10)	34,128	815	11,765	21,743	4,154	19.1%

Data Set 9:

		Initial Population (IP - Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	Exc 1* (# of unique children from IP with restorations, extractions etc. on ALL 4 permanent first molars prior to end of reporting year)	Exc 2* (# of unique children from IP with sealants prior to beginning of reporting year.)	DEN after exclusions (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Rate
2014	Total	50,933	877	12,059	37,997	7,275	19.1%
	7 (>=7 and <8)	17,667	123	1,492	16,052	3,039	18.9%
	8 (>=8 and <9)	17,140	289	4,295	12,556	2,725	21.7%
	9 (>=9 and <10)	16,126	465	6,272	9,389	1,511	16.1%
2015	Total	66,150	1,083	14,305	50,762	10,995	21.7%
	7 (>=7 and <8)	22,765	122	1,697	20,946	4,423	21.1%
	8 (>=8 and <9)	21,990	365	5,022	16,603	4,030	24.3%
	9 (>=9 and <10)	21,395	596	7,586	13,213	2,542	19.2%
2016	Total	63,215	1,151	16,540	45,524	12,086	26.5%

	7 (>=7 and <8)	20,936	227	2,162	18,547	4,904	26.4%
	8 (>=8 and <9)	21,544	326	5,937	15,281	4,496	29.4%
	9 (>=9 and <10)	20,735	598	8,441	11,696	2,686	23.0%
2017	Total	63,149	1,321	19,202	42,626	12,786	30.0%
	7 (>=7 and <8)	20,529	192	2,357	17,980	5,224	29.1%
	8 (>=8 and <9)	20,922	509	6,816	13,597	4,639	34.1%
	9 (>=9 and <10)	21,698	620	10,029	11,049	2,923	26.5%

Summary of Measure rate: All Children, 7 – 9 years with exclusion for children who have all four molars restored or extracted OR have prior sealants.

Sample Set		IPP (Denominator before exclusions) (7-9 years enrolled for at least 180 continuous days in the reporting year)	DEN (From initial population apply exclusions, ensure deduplication between exclusion categories)	NUM (From DEN, count those who received sealant in permanent first molar in the reporting year)	Measure Rate (NUM/ DEN)
Data Set 1	2014	24,537	19,639	3,102	15.80%
	2015	27,667	21,438	3,749	17.50%
	2016	29,651	22,641	4,394	19.40%
	2017	30,284	22,793	4,772	20.90%
Data Set 2	2014	87,994	60,459	16,668	27.6%
	2015	86,911	60,035	16,800	28.0%
	2016	85,613	58,908	16,421	27.9%
	2017	89,850	63,698	16,825	26.4%
Data Set 3	2014	68,837	49,091	12,292	25.0%
	2015	76,118	56,085	13,840	24.7%
	2016	80,644	59,735	14,926	25.0%
	2017	80,224	57,243	14,690	25.7%
	2018	81,840	57,661	14,580	25.3%
Data Set 4	2014	125,565	88,303	16,585	18.78%
	2015	135,781	96,036	17,359	18.08%
	2016	133,482	94,898	19,513	20.56%
	2017	126,614	87,214	18,047	20.69%
	2018	118,859	81,048	16,915	20.87%
Data Set 5	2014	43,251	35,300	7,025	19.90%
	2015	30,677	24,985	5,087	20.36%
	2016	31,453	26,144	5,242	20.05%
	2017	28,421	23,395	4,683	20.02%
	2018	25,909	21,273	4,139	19.46%
Data Set 6	2014	210,910	136,475	41,166	30.16%
	2015	239,144	142,856	44,950	31.47%
	2016	236,306	134,575	42,856	31.85%
	2017	213,373	116,540	36,279	31.13%

	2018	180,949	96,874	29,601	30.56%
Data Set 7	2016	324,248	183,158	59,035	32.20%
	2017	336,097	191,226	61,508	32.20%
Data Set 8	2014	112,862	90,902	14,100	15.50%
	2015	81,678	67,143	13,551	20.20%
	2016	99,870	80,326	17,918	22.30%
	2017	100,068	75,277	17,291	23.00%
Data Set 9	2014	50,933	37,997	7,275	19.10%
	2015	66,150	50,762	10,995	21.70%
	2016	63,215	45,524	12,086	26.50%
	2017	63,149	42,626	12,786	30.00%

APPENDIX 2: Overall Placement of Sealants, Permanent First Molars

Data As Provided

		Population age >=9 and <10 enrolled for at least 180 continuous days in the reporting year	Of those, children who EVER received sealant (i.e. at least one sealant)	EXC1	% at least one sealant by 10 th Birthdate (exclusions of no sealable molars)	Of Population # who EVER received at least one sealant on their permanent first molar, how many received sealants on ALL 4 molars	% all four sealants by 10 th Birthdate (exclusions of no sealable molars)
Data Set 1	2014	7,681	3,053	191	40.76%	1,813	24.21%
	2015	8,839	3,882	279	45.35%	2,485	29.03%
	2016	9,912	4,532	317	47.23%	2,973	30.98%
	2017	10,224	4,920	298	49.57%	3,370	33.95%
Data Set 2	2014	30,015	17,559	359	59.21%	13,913	46.91%
	2015	29,615	17,188	343	58.72%	13,697	46.79%
	2016	29,561	17,267	337	59.08%	13,973	47.81%
	2017	31,351	17,234	302	55.51%	13,961	44.96%
Data Set 3	2014	23,547	12,000	374	51.78%	9,306	40.16%
	2015	26,358	12,583	370	48.42%	9,978	38.39%
	2016	28,058	13,009	331	46.92%	10,251	36.97%
	2017	27,795	13,877	314	50.50%	11,032	40.14%
	2018	28,742	14,937	396	52.70%	11,788	41.59%
Data Set 4	2014	39,268	18,570	2,654	50.72%	12,502	34.15%
	2015	43,898	21,031	2,824	51.20%	14,372	34.99%
	2016	44,952	22,093	2,296	51.79%	15,579	36.52%
	2017	43,782	22,203	2,026	53.17%	15,834	37.92%
	2018	41,120	21,736	1,844	55.34%	15,635	39.81%
Data Set 5	2014	14,354	4,942	504	35.68%	2,838	20.49%
	2015	10,208	3,720	375	37.83%	2,221	22.59%
	2016	10,496	3,325	372	32.84%	1,944	19.20%
	2017	10,000	3,114	379	32.37%	1,870	19.44%
	2018	9,634	3,020	357	32.55%	1,784	19.23%

Data Set 6	2014	61,487	31,358	7,522	58.11%	15,958	29.57%	
	2015	77,248	44,978	11,123	68.02%	27,057	40.92%	
	2016	77,941	48,245	12,132	73.31%	30,144	45.81%	
	2017	75,633	47,593	12,223	75.06%	30,064	47.41%	
	2018	71,799	45,157	11,923	75.42%	28,717	47.96%	
Data Set 7	2016	108,417	67,705	9,873	68.71%	42,906	43.54%	
	2017	110,009	69,020	10,112	69.09%	43,740	43.79%	
Data Set 8	2014	35,901	13,168	789	37.50%	9,069	25.83%	
	2015	27,011	10,202	616	38.65%	7,288	27.61%	
	2016	33,788	13,853	804	42.00%	9,856	29.88%	
	2017	34,128	16,005	815	48.04%	11,664	35.01%	
Data Set 9	2014	16,126	6,375	465	40.71%	4,970	31.73%	
	2015	21,395	7,709	596	37.06%	5,947	28.59%	
	2016	20,735	8,564	598	42.53%	6,543	32.49%	
	2017	21,698	10,156	620	48.18%	7,824	37.12%	

Evaluating Enrollment for 12 months continuous enrollment with one 45 day gap prior to 10th birthdate Compared to 180 days in Reporting year

	Reporting Year	Population enrolled for 12 months continuous enrollment with one 45 day gap prior to 10 th birthdate in reporting year	Exc 1	Of those, children who EVER received sealant (i.e. at least one sealant)	Of Population # who EVER received at least one sealant on their permanent first molar, how many received sealants on ALL 4 molars	% at least one sealant by 10 th Birthdate (exclusions of no sealable molars)	% all four sealants by 10 th Birthdate (exclusions of no sealable molars)
Data Set 3	2014	19824	366	10,920	8,661	56.12%	44.51%
	2015	20561	401	10,960	8,534	54.37%	42.33%
	2016	22168	405	11,358	9,060	52.19%	41.63%
	2017	24347	373	12,038	9,491	50.21%	39.59%
	2018	24603	360	13,003	10,394	53.64%	42.87%
Data Set 4							
	2015	35,311	3,659	16,709	11,404	52.79%	36.03%
	2016	40,976	4,297	20,212	14,116	55.11%	38.49%
	2017	41,222	3,618	21,414	15,385	56.95%	40.91%
	2018	39,117	3,200	21,032	15,287	58.56%	42.56%
Data Set 5	2014	3,179	258	1,434	748	49.09%	25.61%
	2015	3,427	330	1,761	1,091	56.86%	35.23%
	2016	3,784	381	2,106	1,394	61.89%	40.96%
	2017	3,940	510	2,304	1,529	67.17%	44.58%
	2018	3,726	480	2,304	1,651	70.98%	50.86%
Data Set 6	2014	41,205	6,535	18,118	7,736	52.26%	22.31%
	2015	49,254	10,194	25,220	14,202	64.57%	36.36%
	2016	57,479	13,312	32,002	20,856	72.46%	47.22%
	2017	57,916	13,611	33,105	22,436	74.72%	50.64%
	2018	55,819	13,541	31,767	21,923	75.14%	51.85%
Data Set 7	2016	79340	16317	44732	29369	70.98%	46.60%
	2017	80126	16738	45237	29705	71.37%	46.86%

APPENDIX 3: Overall Placement of Sealants, Permanent Second Molars

Data As Provided

Index Year 13								
		EXCLUSION (Exclude all children with ALL 4 MOLARS previously treated: D1352; D2140, D2150, D2160, D2161, D2391, D2392, D2393 OR D2394; D2410 – D2999; D3110-3999; D7111- 7250; D6205- 6793] (**Look-back period exactly 48 months prior to the index birthdate)	DEN after exclusions(From initial population apply exclusions)	NUM 1(From DEN after exclusions, count those who received AT LEAST ONE sealant in permanent second molar in the 48 months prior to the index birthdate)	Rate 1 At least one sealant	NUM 2 (From DEN after exclusions, count those who received sealants ON ALL 4 PERMANENT 2ND MOLARS in the 48 months prior to the index birthdate) (**NUM2 will be a subset of NUM1)	Rate 2: All 4 Permanent 2nd Molars Sealed	
Data Set 1								
2014	24,816	104	24,712	4,167	16.90%	2,157	8.70%	
2015	27,388	110	27,278	4,397	16.10%	2,256	8.30%	
2016	28,210	109	28,101	5,069	18.00%	2,615	9.30%	
2017	27,553	95	27,458	5,183	18.90%	2,731	9.90%	
Data Set 2								
2017	44,047	596	43,451	9,656	22.20%	5,164	11.90%	
2018	47,548	642	46,906	10,887	23.20%	5,855	12.50%	
Data Set 3								
2014	20,449	196	20,253	3,067	15.10%	1,311	6.50%	
2015	11,915	125	11,790	2,111	17.90%	1,042	8.80%	
2016	18,097	186	17,911	3,136	17.50%	1,552	8.70%	

2017	23,148	234	22,914	4,422	19.30%	2,174	9.50%
2018	21,670	206	21,464	4,393	20.50%	2,229	10.40%
Data Set 4							
2014	27,106	254	26,852	6,705	25.00%	3,461	12.90%
2015	26,880	249	26,631	6,555	24.60%	3,422	12.80%
2016	27,213	266	26,947	6,598	24.50%	3,530	13.10%
2017	26,746	242	26,504	6,587	24.90%	3,524	13.30%
2018	26,333	217	26,116	6,213	23.80%	3,359	12.90%
Data Set 5							
2016	65,129	4,888	60,241	24,648	40.90%	9,641	16.00%
2017	70,638	5,422	65,216	26,648	40.90%	10,508	16.10%
2018	77,335	6,068	71,267	29,117	40.90%	11,470	16.10%
Data Set 6							
2015	22,742	422	22,320	3,740	16.76%	1,761	7.89%
2016	36,517	694	35,823	6,278	17.53%	2,952	8.24%
2017	36,560	559	36,001	6,783	18.84%	3,341	9.28%
2018	35,415	523	34,892	6,970	19.98%	3,485	9.99%
Data Set 7							
2014	33,353	1,512	31,841	12,306	38.65%	4,259	13.38%
2015	45,860	2,089	43,771	17,088	39.04%	6,400	14.62%
2016	49,025	2,443	46,582	18,720	40.19%	7,251	15.57%
2017	49,869	2,524	47,345	18,924	39.97%	7,438	15.71%
2018	45,135	2,422	42,713	16,984	39.76%	6,622	15.50%
Data Set 8							
2014	1,897	29	1,868	613	32.82%	241	12.90%
2015	3,601	50	3,551	1,122	31.60%	425	11.97%
2016	3,307	59	3,248	1,055	32.48%	415	12.78%
2017	3,650	71	3,579	1,230	34.37%	517	14.45%
2018	3,680	72	3,608	1,250	34.65%	513	14.22%
Data Set 9							
2015	14,518	87	14,431	2,534	17.60%	1,044	7.20%

2016	13,120	93	13,027	2,836	21.80%	1,236	9.50%
2017	12,056	85	11,971	3,126	26.10%	1,358	11.30%
Index year: 14							
Data Set 1							
2014	24,047	272	23,775	6,929	29.10%	3,918	16.50%
2015	24,816	282	24,534	7,071	28.80%	4,051	16.50%
2016	27,388	282	27,106	7,734	28.50%	4,395	16.20%
2017	28,210	264	27,946	8,804	31.50%	4,972	17.80%
Data Set 2							
2017	43,085	1,118	41,967	12,709	30.30%	7,484	17.80%
2018	46,195	1,185	45,010	13,969	31.00%	8,107	18.00%
Data Set 3							
2014	20,197	350	19,847	3,876	19.50%	1,784	9.00%
2015	12,096	253	11,843	2,845	24.00%	1,462	12.30%
2016	17,632	398	17,234	3,999	23.20%	2,121	12.30%
2017	22,309	457	21,852	5,532	25.30%	2,974	13.60%
2018	20,582	416	20,166	5,564	27.60%	3,005	14.90%
Data Set 4							
2014	27,846	479	27,367	10,389	38.00%	5,991	21.90%
2015	27,583	478	27,105	10,131	37.40%	5,793	21.40%
2016	27,335	482	26,853	10,081	37.50%	5,808	21.60%
2017	27,349	478	26,871	10,185	37.90%	6,010	22.40%
2018	27,448	433	27,015	9,787	36.20%	5,790	21.40%
Data Set 5							
2016	62,435	7,964	54,471	29,142	53.50%	12,592	23.10%
2017	65,979	8,529	57,450	30,920	53.80%	13,605	23.70%
2018	70,921	9,368	61,553	32,845	53.40%	14,437	23.50%
Data Set 6							
2015	22,722	963	21,759	5,272	24.23%	2,662	12.23%

2016	36,405	1,387	35,018	8,545	24.40%	4,330	12.37%	
2017	35,293	1,327	33,966	8,975	26.42%	4,721	13.90%	
2018	34,667	1,136	33,531	9,436	28.14%	5,003	14.92%	
Data Set 7								
2014	31,047	2,586	28,461	13,353	46.92%	5,003	17.58%	
2015	42,807	3,927	38,880	20,002	51.45%	8,253	21.23%	
2016	46,841	4,548	42,293	22,258	52.63%	9,690	22.91%	
2017	47,103	4,851	42,252	22,647	53.60%	10,008	23.69%	
2018	47,206	4,864	42,342	22,559	53.28%	10,086	23.82%	
Data Set 8								
2014	1,996	56	1,940	793	40.88%	342	17.63%	
2015	3,616	123	3,493	1,489	42.63%	659	18.87%	
2016	3,292	124	3,168	1,362	42.99%	590	18.62%	
2017	3,473	148	3,325	1,545	46.47%	749	22.53%	
2018	3,727	162	3,565	1,669	46.82%	755	21.18%	
Data Set 9								
2015	15,066	223	14,843	3,722	25.10%	1,672	11.30%	
2016	13,170	211	12,959	4,010	30.90%	1,935	14.90%	
2017	12,478	226	12,252	4,479	36.60%	2,115	17.30%	
Index Year: 15th Birthday								
Data Set 1								
2014	23,281	492	22,789	8,520	37.40%	5,069	22.20%	
2015	24,047	473	23,574	8,789	37.30%	5,189	22.00%	
2016	24,816	498	24,318	9,074	37.30%	5,421	22.30%	
2017	27,388	504	26,884	10,271	38.20%	6,149	22.90%	
Data Set 2								
2017	42,740	1,684	41,056	13,068	31.80%	7,737	18.80%	
2018	44,900	1,730	43,170	14,250	33.00%	8,481	19.60%	
Data Set 3								
2014	19,335	479	18,856	3,939	20.90%	1,982	10.50%	

2015	12,142	400	11,742	2,915	24.80%	1,498	12.80%
2016	17,477	571	16,906	4,167	24.60%	2,234	13.20%
2017	21,443	713	20,730	5,546	26.80%	2,966	14.30%
2018	19,692	631	19,061	5,624	29.50%	3,153	16.50%
Data Set 4							
2014	28,227	747	27,480	11,516	41.90%	6,654	24.20%
2015	28,279	738	27,541	11,608	42.10%	6,764	24.60%
2016	27,891	724	27,167	11,518	42.40%	6,805	25.00%
2017	27,568	699	26,869	11,491	42.80%	6,715	25.00%
2018	27,992	673	27,319	11,175	40.90%	6,630	24.30%
Data Set 5							
2016	59,396	9,742	49,654	28,032	56.50%	12,277	24.70%
2017	62,775	10,776	51,999	29,378	56.50%	12,901	24.80%
2018	65,716	11,493	54,223	30,197	55.70%	13,186	24.30%
Data Set 6							
2015	22,800	1,597	21,203	5,963	28.12%	2,920	13.77%
2016	35,784	2,258	33,526	9,458	28.21%	4,817	14.37%
2017	35,074	2,132	32,942	9,785	29.70%	5,112	15.52%
2018	33,345	1,985	31,360	9,959	31.76%	5,415	17.27%
Data Set 7							
2014	27,109	3,012	24,097	10,906	45.26%	3,903	16.20%
2015	39,690	5,249	34,441	18,452	53.58%	7,760	22.53%
2016	43,296	6,229	37,067	21,181	57.14%	9,246	24.94%
2017	44,689	6,746	37,943	22,203	58.52%	10,049	26.48%
2018	44,543	7,193	37,350	21,825	58.43%	10,075	26.97%
Data Set 8							
2014	1,858	90	1,768	697	39.42%	281	15.89%
2015	3,584	155	3,429	1,557	45.41%	726	21.17%
2016	3,244	192	3,052	1,452	47.58%	647	21.20%
2017	3,299	225	3,074	1,552	50.49%	702	22.84%
2018	3,537	238	3,299	1,767	53.56%	850	25.77%

Data Set 9							
2015	14,715	378	14,337	4,307	30.00%	2,079	14.50%
2016	13,123	366	12,757	4,221	33.10%	2,077	16.30%
2017	11,885	359	11,526	4,630	40.20%	2,342	20.30%

APPENDIX 4: DQA Measure Technical Specifications: Administrative Claims-Based Measures

Prevention: Sealant Receipt on Permanent 1st Molars

Description: Percentage of enrolled children, who have ever received sealants on a permanent **first** molar tooth: (1) at least one sealant and (2) all four molars sealed by 10th birthdate
Numerator: Unduplicated number of enrolled children who ever received sealants on a permanent **first** molar tooth: (1) at least one sealant and (2) all four molars sealed
Denominator: Unduplicated number of enrolled children with their 10th birthdate in measurement year
Exclusions: Children who have received treatment (restorations, extractions, endodontic, prosthodontic, and other dental treatments) on **all four** first permanent molars in the 48 months prior to the 10th birthdate
Rates: NUM1/DEN; NUM2/DEN (after exclusions)

Rationale: Dental caries is the most common chronic disease in children in the United States (1). For 2015–2016, prevalence of total caries (untreated and treated) was 45.8% and untreated caries was 13.0% among youth aged 2–19 years (2). Identifying caries early is important to reverse the disease process, prevent progression of caries, and reduce incidence of future lesions. In 2014, 52% of all children and 60% of poor children (FPL<100%) did not have a dental visit during the year (3). Evidence-based Clinical Recommendations recommend that sealants are effective intervention for reducing the incidence of carious lesions in the occlusal surfaces of primary and permanent molars in children and adolescents (4).

- (1) Centers for Disease Control and Prevention. Hygiene-related diseases: dental caries. Updated September 22, 2016. Available at: http://www.cdc.gov/healthywater/hygiene/disease/dental_caries.html. Accessed April 2nd, 2019.
- (2) Fleming E, Afzul J. Prevalence of total and untreated dental caries among youth: United States, 2015–2016. NCHS Data Brief, no 307. Hyattsville, MD: National Center for Health Statistics. 2018.
- (3) Nasseh K, Vujicic M. Dental care utilization steady among working-age adults and children, up slightly among the elderly. Health Policy Institute Research Brief. American Dental Association. October 2016. Available from: http://www.ada.org/~media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_1016_1.pdf
- (4) Wright, John T. et al. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants. The Journal of the American Dental Association, Volume 147, Issue 8, 672 - 682.e12

Level of Aggregation: Health Plan/Program

Improvement Noted As: A higher score indicates better quality.

Data Required: Administrative enrollment and claims data; data for reporting year and 3 years prior. When using claims data to determine service receipt, include both paid and unpaid claims (including pending, suspended, and denied claims).

Measure Limitations due to Limitations of Administrative Data

- (1) Claims data cannot identify (a) teeth with active decay, (b) sealants not billed to the program/plan, or (c) treatment (e.g., restorations/extractions) not billed to the program/plan, thus impacting the precision of both the numerator and denominator.
- (2) Comparisons would be biased if programs being compared have significant differences in enrollment duration resulting in differences in the availability of complete treatment history for enrollees, which reduces the ability to consistently identify children to be included in the

numerator or excluded from the denominator. However, this is not unique to dental measures.

- (3) The 12-month enrollment criterion, with the allowed single gap in coverage, may result in a significantly reduced population that is eligible for inclusion in the denominator in programs with shorter enrollment durations (greater “churn”) and, therefore, may be less representative of the population that is the focus of measurement.

Measure Calculation:

1. Check if the subject meets age criterion:¹³
 - a. If child has his/her 10th birthdate during the reporting year, then proceed to next step.
 - b. If age criterion is not met or there are missing or invalid field codes (e.g., date of birth), then STOP processing. This subject does not get counted.
2. Check if subject is continuously enrolled for 12 months prior to the child's 10th birthdate with an allowable single gap in continuous enrollment of no more 45 days (1 month gap for programs/plans that verify enrollment on a monthly basis).¹⁴
 - a. If subject meets continuous enrollment criterion, then proceed to next step.
 - b. If subject does not meet enrollment criterion, then STOP processing. This enrollee will not be included in the measure calculation.

YOU NOW HAVE THE INITIAL POPULATION (IP) OF ALL CHILDREN WHO MEET THE AGE AND THE ENROLLMENT CRITERIA

3. **EXCLUSION:** Check if subject qualifies for an exclusion from the denominator because child has received treatment (restorations, extractions, endodontic, prosthodontic and other dental treatments) on **all four** first permanent molars in the **48 months prior to the 10th birthdate:**
 - a. On permanent first molar maxillary left [TOOTH NUMBER=14 using the Universal Numbering System]; check if subject meets any of the criteria:
 - i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MODBL or MOL or DOL or MOB or MODB or DOB or BO or LO]¹⁵
OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
 - iv. Subject has any ENDODONTIC CODE [D3110- D3999]

¹³ Medicaid/CHIP programs should remove those individuals who do not qualify for dental benefits. The qualifying criteria should be reported.

¹⁴ Enrollment in “same” plan vs. “any” plan: At the state program level (e.g., Medicaid/CHIP) a criterion of “any” plan applies versus at the health plan (e.g., MCO) level a criterion of “same” plan applies. The criterion used should be reported with the measure score. While this prevents direct aggregation of results from plan to program, each entity is given due credit for the population it serves. Thus, states with multiple MCOs should not merely “add up” the plan level scores but should calculate the state score from their database to allow inclusion of individuals who may be continuously enrolled but might have switched plans in the interim.

¹⁵ All surface combinations including the occlusal surface should be included.

- OR
 - v. Subject has any EXTRACTION CODE [D7111- D7250]
 - OR
 - vi. Subject has any PROSTHODONTIC CODE [D6205- D6793]

AND

- b. On permanent first molar maxillary right [TOOTH NUMBER=3 using the Universal Numbering System]; check if subject meets any of the criteria then EXCLUDE from the denominator:
 - i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
 - OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MODBL or MOL or DOL or MOB or MODB or DOB or BO or LO]¹⁶
 - OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
 - OR
 - vii. Subject has any ENDODONTIC CODE [D3110- D3999]
 - OR
 - iv. Subject has any EXTRACTION CODE [D7111- D7250]
 - OR
 - v. Subject has any PROSTHODONTIC CODE [D6205- D6793]

AND

- c. On permanent first molar mandibular left; [TOOTH NUMBER=19 using the Universal Numbering System]; check if subject meets any of the criteria then EXCLUDE from the denominator:
 - i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
 - OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MODBL or MOL or DOL or MOB or MODB or DOB or BO or LO]⁴
 - OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
 - OR
 - viii. Subject has any ENDODONTIC CODE [D3110- D3999]
 - OR
 - iv. Subject has any EXTRACTION CODE [D7111- D7250]
 - OR
 - v. Subject has any PROSTHODONTIC CODE [D6205- D6793]

AND

- d. On permanent first molar mandibular right; [TOOTH NUMBER=30 using the Universal Numbering System]; check if subject meets any of the criteria then EXCLUDE from the denominator:
 - i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
 - OR
 - ii. Subject has any RESTORATIVE CODE that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MODBL or MOL or DOL or MOB or MODB or DOB or BO or LO]⁴
 - OR

¹⁶ All surface combinations including the occlusal surface should be included.

- ix. Subject has any ENDODONTIC CODE [D3110- D3999]
OR
- iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
- iv. Subject has any EXTRACTION CODE [D7111- D7250]
OR
- v. Subject has any PROSTHODONTIC CODE [D6205-D6793]

If **ALL** permanent first molars **were previously treated** then the subject ***does not*** have at least one sealable molar; **remove** this enrollee from the denominator; **STOP** processing.

YOU NOW HAVE DENOMINATOR FOLLOWING EXCLUSION FOR TREATMENT: Enrollees who meet the age and enrollment criteria who have NOT had all first permanent molars previously treated (i.e., have at least one permanent first molar that is a candidate for a sealant)

FOR STEPS 4 – 6 below, for each child in the denominator, look back within claims history in the 12 months prior to the 10th birthdate AND for 3 additional prior years (48 months in total). Enrollment in prior years is not necessary. Programs/plans that do not have a 4-year look-back claims history prior to the 10th birthdate must include information on the data limitation and the number of available years of claims history.

4. Check if subject ever received a sealant on at least one permanent first molar in the 48 months prior to the 10th birthdate:
 - a. If [CDT CODE] = D1351 in the 48 months prior to the 10th birthdate, AND
 - b. If [TOOTH-NUMBER] = 3 OR 14 OR 19 OR 30, using the Universal Numbering System, then include in [numerator 1](#); proceed to next step.
 - c. If both a AND b are not met, then STOP processing. This enrollee is already included in the denominator but will not be included in the numerator.

YOU NOW HAVE NUMERATOR (NUM1) COUNT: Enrollees who have ever received a sealant on at least one permanent first molar

5. Check if sealants were placed on all four permanent first molars in the 48 months prior to the 10th birthdate:
 - a. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 3, using the Universal Numbering System, in the 48 months prior to the 10th birthdate, AND
 - b. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 14, using the Universal Numbering System, in the 48 months prior to the 10th birthdate, AND
 - c. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 19, using the Universal Numbering System, in the 48 months prior to the 10th birthdate, AND
 - d. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 30, using the Universal Numbering System, in the 48 months prior to the 10th birthdate, then include in [numerator 2](#); STOP processing.
 - e. If a AND b AND c AND d are not all met, then STOP processing. This enrollee is not included in numerator 2.

YOU NOW HAVE NUMERATOR (NUM2) COUNT: Enrollees who have received sealants on ALL FOUR permanent first molars

6. When reporting the measure score, report:

- a. Number of enrollees meeting age and enrollment criteria (before exclusion) (IP)
- b. Number of enrollees excluded (EXC)
- c. Percentage of enrollees excluded ($\%EXC=EXC/IP$)
- d. Number of enrollees in denominator after exclusions ($DEN=IP-EXC$)
- e. Number of enrollees in numerator 1 (NUM1)
- f. Number of enrollees in numerator 2 (NUM2)
- g. Measure score rate 1: at least one sealant ($NUM1/DEN$)
- h. Measure score rate 2: all four molars sealed ($NUM2/DEN$)

*** Note: Reliability of the measure score depends on the quality of the data that are used to calculate the measure. The percentages of missing and invalid data for these data elements must be investigated prior to measurement. Data elements with high rates of missing or invalid data will adversely affect the subsequent counts that are recorded. For example, records with missing or invalid TOOTH-NUMBER CODE may be counted in the denominator but not in the numerator. These records are assumed to not have had a qualifying service. In this case, a low quality data set will result in a low measure score and will not be reliable.***

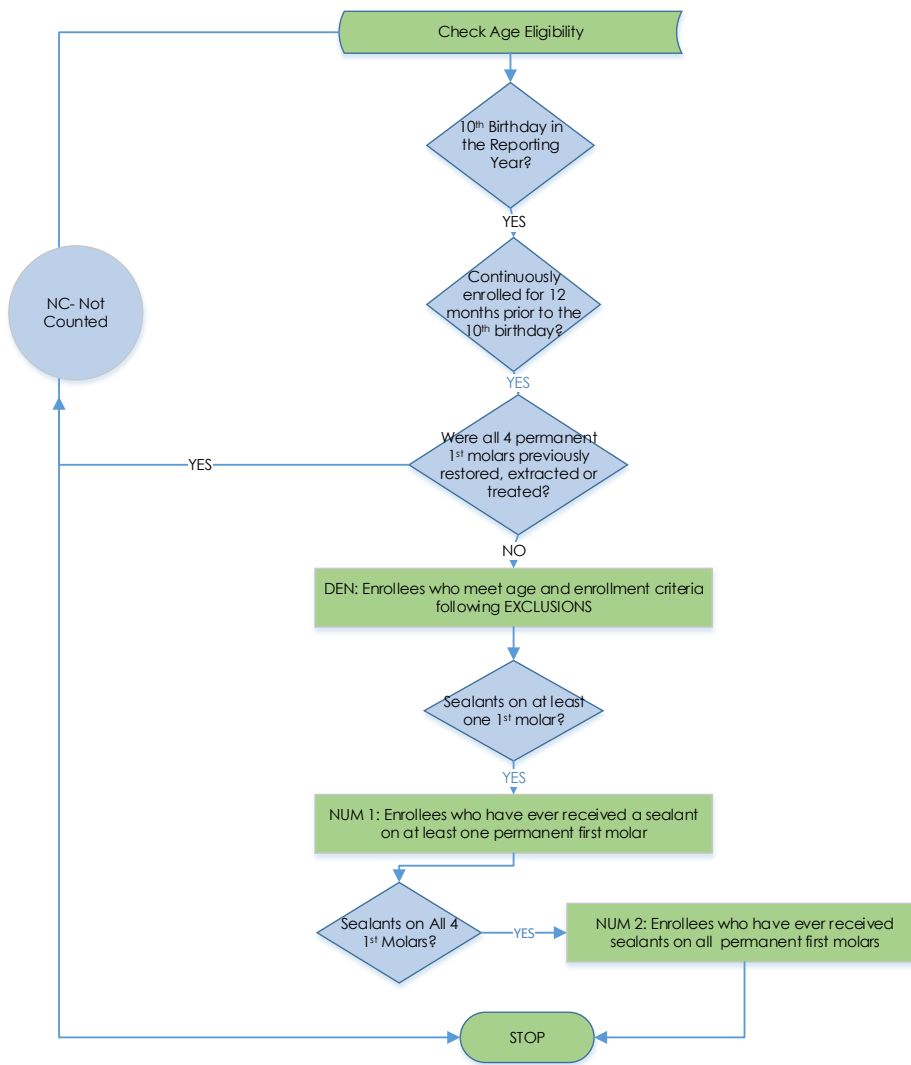
Reporting Guidance

1. Programs adopting this measure should note the measure purpose and limitations indicated above.
2. If programs are interested in understanding the rate of sealant application by risk status, the measure score denominator may be stratified by caries risk codes present during the reporting year:
 - Elevated risk (D0602 OR D0603)
 - Not at elevated risk (D0601)

If the subject has both D0601 and (D0602 or D0603) during the reporting year, the subject should be classified as being at elevated risk. Each subject should be classified into only one stratification category such that the two stratified denominators sum to the total denominator reported in 7d.

3. Consideration should be given to evaluation of the impact of exclusions on the measure scores, particularly when using the measure to compare scores between reporting entities. Such consideration may assist in allowing users to understand the impact of access or other factors on the measure scores and the potential for measurement bias.

Please refer to the User Guide for detailed implementation consideration and reporting guidance.



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These Measures are intended to assist stakeholders in enhancing quality of care. These performance Measures are not clinical guidelines and do not establish a standard of care. The DQA has not tested its Measures for all potential applications.

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THE SPECIFICATIONS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND.

APPENDIX 5: DQA Measure Technical Specifications: Administrative Claims-Based Measures

Prevention: Sealant Receipt on Permanent 2nd Molars

Description: Percentage of enrolled children, who have ever received sealants on a permanent **second** molar tooth: (1) at least one sealant and (2) all four molars sealed by the 15th birthdate

Numerator: Unduplicated number of enrolled children who ever received sealants on a permanent **second** molar tooth: (1) at least one sealant and (2) all four molars sealed

Denominator: Unduplicated number of enrolled children with their 15th birthdate in measurement year

Exclusions: Children who have received treatment (restorations, extractions, endodontic, prosthodontic, and other dental treatments) on **all four** second permanent molars in the 48 months prior to the 15th birthdate

Rate: NUM1/DEN; NUM2/DEN (after exclusions)

Rationale: Dental caries is the most common chronic disease in children in the United States (1). For 2015–2016, prevalence of total caries (untreated and treated) was 45.8% and untreated caries was 13.0% among youth aged 2–19 years (2). Identifying caries early is important to reverse the disease process, prevent progression of caries, and reduce incidence of future lesions. In 2014, 52% of all children and 60% of poor children (FPL<100%) did not have a dental visit during the year (3). Evidence-based Clinical Recommendations recommend that sealants are effective intervention for reducing the incidence of carious lesions in the occlusal surfaces of primary and permanent molars in children and adolescents (4).

- (1) Centers for Disease Control and Prevention. Hygiene-related diseases: dental caries. Updated September 22, 2016. Available at: http://www.cdc.gov/healthywater/hygiene/disease/dental_caries.html. Accessed April 2nd, 2019.
- (2) Fleming E, Aful J. Prevalence of total and untreated dental caries among youth: United States, 2015–2016. NCHS Data Brief, no 307. Hyattsville, MD: National Center for Health Statistics. 2018.
- (3) Nasseh K, Vujicic M. Dental care utilization steady among working-age adults and children, up slightly among the elderly. Health Policy Institute Research Brief. American Dental Association. October 2016. Available from: http://www.ada.org/~media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_1016_1.pdf.
- (4) Wright, John T. et al. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants. The Journal of the American Dental Association, Volume 147, Issue 8, 672 - 682.e12

Level of Aggregation: Health Plan/Program

Improvement Noted As: A higher score indicates better quality.

Data Required: Administrative enrollment and claims data; data for reporting year and 3 years prior. When using claims data to determine service receipt, include both paid and unpaid claims (including pending, suspended, and denied claims).

Measure Limitations due to Limitations of Administrative Data

- (1) Claims data cannot identify (a) teeth with active decay, (b) sealants not billed to the program/plan, or (c) treatment (e.g., restorations/extractions) not billed to the program/plan thus impacting the precision of both the numerator and denominator.
- (2) Comparisons would be biased if programs being compared have significant differences in enrollment duration resulting in differences in the availability of complete treatment history for enrollees, which reduces the ability to consistently identify children who should be included in the numerator and excluded from the denominator. However, this is not unique to dental measures.

- (3) The 12-month enrollment criterion, with the allowed single gap in coverage, may result in a significantly reduced population that is eligible for inclusion in the denominator in programs with shorter enrollment durations (greater "churn") and, therefore, may be less representative of the population that is the focus of measurement.

Measure Calculation:

1. Check if the subject meets age criterion:¹⁷
 - a. If child has his/her 15th birthdate during the reporting year, then proceed to next step.
 - b. If age criterion is not met or there are missing or invalid field codes (e.g., date of birth), then STOP processing. This subject does not get counted.
2. Check if subject is continuously enrolled for 12 months prior to the child's 15th birthdate with an allowable single gap in continuous enrollment of no more 45 days (1-month gap for programs/plans that verify enrollment on a monthly basis).¹⁸
 - a. If subject meets continuous enrollment criterion, then proceed to next step.
 - b. If subject does not meet enrollment criterion, then STOP processing. This enrollee will not be included in the measure calculation.

YOU NOW HAVE THE INITIAL POPULATION (IP) OF ALL CHILDREN WHO MEET THE AGE AND THE ENROLLMENT CRITERIA

3. **EXCLUSION:** Check if subject qualifies for an exclusion from the denominator because child has received treatment (restorations, extractions, endodontic, prosthodontic and other dental treatments) on **all four** second permanent molars in the **48 months prior to the 15th birthdate**:
 - a. On permanent second molar maxillary left [TOOTH NUMBER=15 using the Universal Numbering System]; check if subject meets any of the criteria:
 - i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MOL or DOL or MOB or MODB or MODBL or DOB or BO or LO]¹⁹
OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
 - iv. Subject has any ENDODONTIC CODE [D3110- D3999]
OR
 - v. Subject has any EXTRACTION CODE [D7111- D7250]

¹⁷ **Medicaid/CHIP programs should remove those individuals who do not qualify for dental benefits.** The qualifying criteria should be reported.

¹⁸ **Enrollment in "same" plan vs. "any" plan:** At the **state** program level (e.g., Medicaid/CHIP) a criterion of "**any**" plan applies versus at the **health plan** (e.g., MCO) level a criterion of "**same**" plan applies. The criterion used should be reported with the measure score. While this prevents direct aggregation of results from plan to program, each entity is given due credit for the population it serves. Thus, states with multiple MCOs should not merely "add up" the plan level scores but should calculate the state score from their database to allow inclusion of individuals who may be continuously enrolled but might have switched plans in the interim.

¹⁹ All surface combinations including the occlusal surface should be included.

- OR
- vi. Subject has any PROSTHODONTIC CODE [D6205- D6793]
- AND
- b. On permanent second molar maxillary right [TOOTH NUMBER=2 using the Universal Numbering System]; check if subject meets any of the criteria:
- i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MOL or DOL or MOB or MODB or MODBL or DOB or BO or LO]¹⁹
OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
 - iv. Subject has any ENDODONTIC CODE [D3110- D3999]
OR
 - v. Subject has any EXTRACTION CODE [D7111- D7250]
OR
 - vi. Subject has any PROSTHODONTIC CODE [D6205- D6793]
- AND
- c. On permanent second molar mandibular left; [TOOTH NUMBER=18 using the Universal Numbering System]; check if subject meets any of the criteria:
- i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MOL or DOL or MOB or MODB or MODBL or DOB or BO or LO]¹⁹
OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
 - iv. Subject has any ENDODONTIC CODE [D3110- D3999]
OR
 - v. Subject has any EXTRACTION CODE [D7111-D7250]
OR
 - vi. Subject has any PROSTHODONTIC CODE [D6205- D6793]
- AND
- d. On permanent second molar mandibular right; [TOOTH NUMBER=31 using the Universal Numbering System]; check if subject meets any of the criteria:
- i. Subject has PREVENTIVE RESIN RESTORATION CODE [D1352]
OR
 - ii. Subject has any RESTORATIVE CODE [D2140, D2150, D2160, D2161, D2391, D2392, D2393 or D2394] that includes OCCLUSAL TOOTH SURFACE = [MO or DO or MOD or MODL or MOL or DOL or MOB or MODB or MODBL or DOB or BO or LO]¹⁹
OR
 - iii. Subject has any RESTORATIVE CODE [D2410 – D2999]
OR
 - iv. Subject has any ENDODONTIC CODE [D3110- D3999]
OR
 - v. Subject has any EXTRACTION CODE [D7111- D7250]

- OR
- vi. Subject has any PROSTHODONTIC CODE [D6205- D6793]

If **ALL** permanent second molars **were previously treated**, then the subject ***does not*** have at least one sealable molar; **remove** this enrollee from the denominator; **STOP** processing.

YOU NOW HAVE DENOMINATOR FOLLOWING EXCLUSIONS FOR PRIOR TREATMENT: Enrollees who meet the age and enrollment criteria who have NOT had all second permanent molars previously treated (i.e., have at least one permanent second molar that is a candidate for a sealant)

FOR STEPS 4 – 6 below, for each child in the denominator, look back within the claims history in the 12 months prior to the 15th birthdate AND for 3 additional prior years (48 months in total). Enrollment in prior years is not necessary. Programs/plans that do not have a 4-year look-back claims history prior to the 15th birthday must include information on the data limitation and the number of available years of claims history.

4. Check if subject ever received a sealant on at least one permanent second molar in the 48 months prior to the 15th birthdate:
 - a. If [CDT CODE] = D1351 in the 48 months prior to the 15th birthdate, AND
 - b. If [TOOTH-NUMBER] = 2 OR 15 OR 18 OR 31, using the Universal Numbering System, then include in [numerator 1](#); proceed to next step.
 - c. If both a AND b are not met, then STOP processing. This enrollee is already included in the denominator but will not be included in the numerator.

YOU NOW HAVE NUMERATOR (NUM1) COUNT: Enrollees who have ever received a sealant on at least one permanent second molar

5. Check if sealants were placed on all four permanent second molars in the 48 months prior to the 15th birthdate:
 - a. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 2, using the Universal Numbering System, in the 48 months prior to the 15th birthdate, AND
 - b. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 15, using the Universal Numbering System, in the 48 months prior to the 15th birthdate, AND
 - c. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 18, using the Universal Numbering System, in the 48 months prior to the 15th birthdate, AND
 - d. If [CDT CODE] = D1351 AND [TOOTH-NUMBER] = 31, using the Universal Numbering System, in the 48 months prior to the 15th birthdate, then include in [numerator 2](#); STOP processing.
 - e. If a AND b AND c AND d are not all met, then STOP processing. This enrollee is not included in numerator 2.

YOU NOW HAVE NUMERATOR (NUM2) COUNT: Enrollees who have received sealants on ALL FOUR permanent second molars

6. When reporting the measure score, report:
 - a. Number of enrollees meeting age and enrollment criteria (before exclusion) (IP)
 - b. Number of enrollees excluded (EXC)
 - c. Percentage of enrollees excluded (%EXC=EXC/IP)
 - d. Number of enrollees in denominator after exclusions (DEN=IP-EXC)
 - e. Number of enrollees in numerator 1 (NUM1)
 - f. Number of enrollees in numerator 2 (NUM2)

- g. Measure score rate 1: at least one sealant (NUM1/DEN)
- h. Measure score rate 2: all four molars sealed (NUM2/DEN)

*** Note: Reliability of the measure score depends on the quality of the data that are used to calculate the measure. The percentages of missing and invalid data for these data elements must be investigated prior to measurement. Data elements with high rates of missing or invalid data will adversely affect the subsequent counts that are recorded. For example, records with missing or invalid TOOTH-NUMBER CODE may be counted in the denominator but not in the numerator. These records are assumed to not have had a qualifying service. In this case, a low quality data set will result in a low measure score and will not be reliable.***

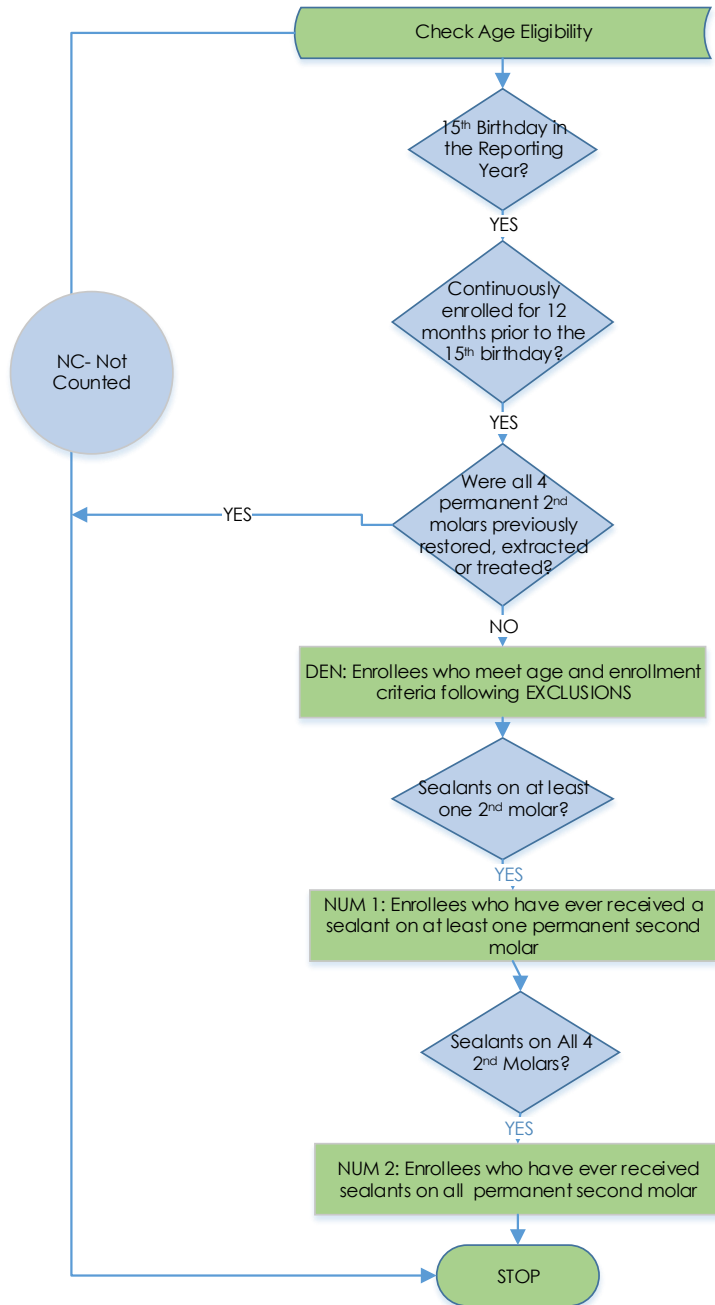
Reporting Guidance

1. Programs adopting this measure should note the measure purpose and limitations indicated above.
2. If programs are interested in understanding the rate of sealant appl Programs adopting this measure should note the measure purpose and limitations indicated above.
3. If programs are interested in understanding the rate of sealant application by risk status, the measure score denominator may be stratified by caries risk codes present during the reporting year:
 - Elevated risk (D0602 OR D0603)
 - Not at elevated risk (D0601)

If the subject has both D0601 and (D0602 or D0603) during the reporting year, the subject should be classified as being at elevated risk. Each subject should be classified into only one stratification category such that the two stratified denominators sum to the total denominator reported in 7d.

4. Consideration should be given to evaluation of the impact of exclusions on the measure scores, particularly when using the measure to compare scores between reporting entities. Such consideration may assist in allowing users to understand the impact of access or other factors on the measure scores and the potential for measurement bias.

Please refer to the User Guide for detailed implementation consideration and reporting guidance.



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