

Dental Value-Based Models and a Proposed Revision of Metrics for  
New York State's Quality Assurance of Preventive Dental Care

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## EXECUTIVE SUMMARY

### Dental Value-Based Models and a Proposed Revision of Metrics for New York State's Quality Assurance of Preventive Dental Care

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The 2000 Surgeon General report declared dental caries (tooth decay) a "silent epidemic" [1]. Dental caries is preventable, yet it is the most common chronic disease among children and adolescents in the US [2]–[6]. US dental care systems have fallen short of preventing avoidable oral diseases and their consequences, despite enormous dental expenditures. Self-care through oral hygiene, a key health behavior for caries risk reduction, is not practiced nearly as consistently or accurately as dentists and health organizations would like [7],[8]. Evidence-based and cost-effective preventive dental treatments exist but are underutilized. Value-based care (VBC) is an effort to strengthen the quality of dental care, decrease unnecessary expenditure and increase cost-effectiveness through an emphasis on prevention. This paper has three aims. Aim #1 is to understand the current dental VBC landscape through a narrative review. It synthesizes the available literature on dental value-based models and their challenges. Aim #2 discusses the need for quality metrics to help meet VBC goals. It evaluates New York State's (NYS) quality assurance of dental care among NYS's Medicaid recipients 0-20 years of age through their Quality Assurance Reporting Requirement (QARR). Aim #3 proposes a revision of metrics and identifies the needed indicators for NYS's quality assurance of preventive dental care for Medicaid recipients 0-20 years of age.

Under Aim #1 Sixty-nine abstracts were reviewed. Forty-six articles met the inclusion criterion and were classified according to four prominent themes: dental metrics, interprofessional collaboration, information technology, and care/case management. Common challenges were identified in dental VBC, including but not limited to, the requirement for interdisciplinary, interoperability; too much involvement of stakeholders; variations in dental treatment modalities and coverage; and challenges in developing appropriate metrics. While initiatives in the peer-reviewed articles leveraged value metrics for the assessment of their programs, no studies among the 46 articles evaluated statewide governmental quality measures' effectiveness for VBC. Gray literature was therefore utilized for Aim #2. The second aim discusses the need for quality metrics to help meet VBC goals and identifies tested and scalable dental metrics. Healthcare Effectiveness

Data Information Set and Dental Quality Alliance were found to be the leading dental metric developers. NYS's Quality Assurance Reporting Requirement (QARR) indicators were identified as the lead metric set used to evaluate NYS's Medicaid Managed Care plans and Managed Care Organizations. Several limitations were identified in NYS's QARR dental metric. It is limited to one dental indicator, it does not measure the quality of dental services and has unintended consequences. Under AIM #3, ten recommended steps are provided for the NYS Department of Health Office of Health Insurance Program (NYS DOH OHIP) to strengthen their quality assurance of preventive dental care among Medicaid recipients 0-20 years of age. The ten steps NYS DOH OHIP can take to develop a dental metric set aimed to assess and improve the utilization of preventive dental services are as follows,

1. Define value from the perspective of the patient
2. Select tested, specific, and measurable metrics
3. Metrics need to be attainable, relevant and anchored within a time frame
4. Metrics need to be appropriate proxies
5. Account for patient characteristics, when feasible
6. Strive for standardized data collection and harmonization
7. Build appropriate information technology infrastructure
8. Reimburse dental providers through alternative payment models
9. Strengthen Provider Accountability by Improving QARR's Use of Dental Metrics
10. Amend QARR to strengthen quality assurance of preventive dental services

A final set of recommendations proposes revisions to NYS's assessment of preventive dental services through QARR. The recommendations provide technical details on the needed amendments and additions for a more robust metric set to improve NYS's quality assurance of preventive dental care among NY's youngest Medicaid recipients. The final set of recommendations which will make system-level changes in dental care delivery and shift NYS towards dental VBC are as follows,

- ❖ Revise QARR's oral health indicator to measure the percentage of all enrolled children under age 21 who received dental services within the reporting year

- ❖ Replace QARR's dental screening encounter code (D0190) with comprehensive (D0150) or periodic (D0120) oral examination codes
- ❖ Create a metric for the application of sealants in the erupted, unrestored adult molar teeth of children.
- ❖ Create a metric for the application of topical fluoride at least once every six months on all teeth of children and adolescents under the age of 21
- ❖ Utilize existing tested and validated preventive dental metrics
- ❖ Raise statewide QARR benchmark metrics annually to encourage higher utilization and success of services
- ❖ Tie performance metrics' achievement to reimbursement (P4P)
- ❖ Evaluate implemented metrics for their effectiveness in reducing the need for restorative services to help achieve VBC goals among NYS Medicaid recipients 0-20 years of age
- ❖ Release an open comment period to seek stakeholders' perception

## TABLE OF CONTENTS

|  |            |
|--|------------|
| <b>ABBREVIATIONS .....</b>   | <b>III</b> |
| <b>GLOSSARY OF DENTAL TERMINOLOGIES .....</b>  | <b>IV</b>  |
| <b>INTRODUCTION.....</b>   | <b>1</b>   |
| <b>SECTION 1: BACKGROUND .....</b>   | <b>1</b>   |
| 1.1 TOOTH DECAY IS A MAJOR DISEASE BURDEN IN THE UNITED STATES .....                                       | 1          |
| 1.2 ECONOMIC BURDEN OF DENTAL DISEASES.....  | 3          |
| 1.3 SELF-CARE HAS BEEN INSUFFICIENT.....   | 4          |
| 1.4 EVIDENCE-BASED & COST-EFFECTIVE PREVENTIVE TREATMENTS EXIST BUT ARE UNDERUTILIZED .....                | 5          |
| 1.5 VBC AIMS TO STRENGTHEN QUALITY OF DENTAL CARE AND COST-EFFECTIVENESS .....                             | 7          |
| <b>SECTION 2: ORAL HEALTH VALUE-BASED CARE INITIATIVES- A SYNTHESIS OF PUBLISHED<br/>INITIATIVES .....</b> | <b>8</b>   |
| 2.1 METHODS FOR NARRATIVE REVIEW .....   | 8          |
| 2.2 INITIATIVES THAT LEVERAGED INTER-PROFESSIONAL COLLABORATION FOR VALUE-BASED CARE (VBC) .....           | 9          |
| 2.3 INITIATIVES THAT LEVERAGED INFORMATION TECHNOLOGY FOR VBC .....  | 11         |
| 2.4 INITIATIVES THAT LEVERAGED CARE/CASE MANAGEMENT FOR VBC .....  | 13         |
| 2.5 INITIATIVES THAT LEVERAGED DENTAL METRICS FOR VBC .....  | 13         |
| 2.6 CHALLENGES IN DENTAL VBC .....   | 15         |
| 2.6.1 Requirement for interdisciplinary and interoperability.....  | 15         |
| 2.6.2 Too Many Stakeholders Involved.....  | 16         |
| 2.6.3 Variation in Dental Treatment Modalities.....  | 17         |
| 2.6.4 Challenges in Developing Appropriate Metrics.....  | 18         |
| <b>SECTION 3: MOVING THE NEEDLE TOWARDS VBC IN NEW YORK STATE.....</b>                                     | <b>19</b>  |
| 3.1 PREVENTIVE DENTAL SERVICES ARE DISRUPTIVE INNOVATIONS .....  | 19         |

3.2 VALUE METRICS CAN BE A VEHICLE TO STRENGTHEN UTILIZATION OF PREVENTIVE DENTAL SERVICES....21

3.3 THE CHALLENGES CAN BE ADDRESSED.....21

**SECTION 4: STRENGTHEN USE OF DENTAL METRICS TO IMPROVE UTILIZATION OF PREVENTIVE DENTAL SERVICES FOR NYS’S VBC ..... 22**

4.1 DEFINE VALUE FROM THE PERSPECTIVE OF THE PATIENT.....22

4.2 SELECT TESTED, SPECIFIC AND MEASURABLE METRICS.....23

4.3 METRICS NEED TO BE ATTAINABLE, RELEVANT, AND ANCHORED WITHIN A TIME FRAME .....26

4.4 METRICS NEED TO BE APPROPRIATE PROXIES.....27

4.5 ACCOUNT FOR PATIENT CHARACTERISTICS WHEN FEASIBLE .....28

4.6 STRIVE FOR STANDARDIZED DATA COLLECTION AND HARMONIZATION .....29

4.7 BUILD APPROPRIATE INFORMATION TECHNOLOGY INFRASTRUCTURE .....29

4.8 REIMBURSE DENTAL PROVIDERS THROUGH ALTERNATIVE PAYMENT MODELS (APM).....30

4.9 STRENGTHEN PROVIDER ACCOUNTABILITY BY IMPROVING QARR’S USE OF DENTAL METRICS .....33

4.10 AMEND QARR TO STRENGTHEN QUALITY ASSURANCE OF PREVENTIVE DENTAL SERVICES.....35

**SECTION 5: RECOMMENDED REVISIONS TO NYS’S ASSESSMENT OF PREVENTIVE DENTAL SERVICES THROUGH QARR ..... 37**

Abbreviations

| Abbreviation | Definition  |
|--------------|---|
| AAPD         | American Academy of Pediatric Dentistry                           |
| ADA          | American Dental Association                                       |
| AHRQ         | Agency for Healthcare Research and Quality                        |
| AOC          | Appropriateness of care   |
| APM          | Alternative Payment Models  |
| BCH ECCC     | Boston Children's Hospital's Early Childhood Caries Collaborative |
| CDC          | Centers for Disease Control and Prevention                        |
| CDHC         | Community Dental Health Coordinators                              |
| CHWs         | Community Health Workers  |
| CMS          | Centers for Medicare & Medicaid Services                          |
| CRA          | Caries risk assessment  |
| DHMO         | Dental Health Maintenance Organization                            |
| DMFS         | Decayed, Missing, Filled Surfaces                                 |
| DQA          | Dental Quality Alliance   |
| DQM          | Dental Quality Measures   |
| EB           | Evidence-based  |
| ED           | Emergency department  |
| EHR          | Electronic health record  |
| EMR          | Electronic medical record   |
| FFS          | Fee for Service   |
| HEDIS        | Healthcare Effectiveness Data Information Set                     |
| HHS          | Department of Health and Human Services                           |
| HMO          | Health Maintenance Organization                                   |
| HRSA         | Health Resources and Services Administration                      |
| ITR          | Interim therapeutic restoration                                   |
| KP           | Kaiser Permanente   |



|         |  |
|---------|--|
| LAN     | Health Care Payment Learning and Action Network                |
| MCHS    | Marshfield Clinic Research Institute in Wisconsin              |
| NCQA    | National Committee for Quality Assurance                       |
| NNOHA   | National Network for Oral Health Access                        |
| NYS DOH | New York State Department of Health                            |
| OHIP    | Office of Health Insurance Program at NYS Department of Health |
| OOC     | Outcomes of care   |
| PCMHP   | Patient-centered medical home payment                          |
| PCP     | Primary care physicians  |
| PMPM    | Per-member/per month   |
| POC     | Process of care  |
| P4P     | Pay for Performance  |
| RHC     | Rural health clinics   |
| RWJF    | Robert Wood Johnson Foundation                                 |
| SDF     | Silver Diamine Fluoride  |
| SCF     | Southcentral Foundation  |
| VBC     | Value-based care   |
| VBP     | Value-based payment  |
| WDG     | Willamette Dental Group  |
| YVFW    | The Yakima Valley Farm Workers                                 |

[Glossary of Dental Terminologies](#)

| Term   | Definition   |
|--------|--|
| Caries | Tooth decay. Breakdown of a tooth from acids made by bacteria.<br>Reversible if found early. |
| Cavity | Tooth decay that leads to a small hole in the tooth.   |

|                                       |   |
|---------------------------------------|---|
| Chlorhexidine                         | An antibacterial mouthwash that kills oral bacteria. Generally used to treat swelling, redness, and bleeding gums. Providers can prescribe it for at-home use.  |
| Dental Hygienist                      | A dental provider who is licensed to conduct risk-based assessments, radiographs, and preventive services. Services are conducted under the supervision of a licensed dentist. Training is from an accredited dental hygiene education program.   |
| Dental Provider                       | Commonly used to refer to insurance companies and dental clinicians.  |
| Dental Sealants                       | Caries arrest and prevention, non-aerosol therapy conducted at a dental clinic by a dentist, dental hygienist, or dental therapist. Sealants are thin white coating applied to the chewing surfaces of the back teeth (molars). Sealants cover the grooves of the back teeth to protect them from caries causing germs. |
| Dental Therapist                      | A dental provider who can perform a dental hygienist's line of work in addition to restorative services. Services are conducted under the supervision of a licensed dentist. Training is from an accredited or non-accredited dental therapy program.   |
| Early Childhood Caries                | Tooth decay in children under the age of six.   |
| Elevated Caries Risk                  | Caries risk assessment categorizes risk status based on protective factors, clinical findings, and social/biological risk factors. When an individual is at medium or high risk of caries based on the caries risk assessment, they are considered to be at elevated caries risk.                                       |
| Interim Therapeutic Restoration (ITR) | A service provided in a dental clinic to arrest caries activity, reduce tooth pain and decrease the need for urgent dental interventions.   |
| Preventive dental services            | Comprises of an oral exam, prophylaxis, x-rays, oral health counseling, and preventative dental treatments such as topical fluoride and dental sealants.  |

|                         |  |
|-------------------------|--|
| Prophylaxis             | Dental cleaning for the prevention of disease in teeth and gums includes scaling and polishing procedures to remove plaque, calculus, and stains.  |
| Restorative services    | Provided in a dental clinic to restore missing, decayed, weakened, or fractured teeth. Examples include fillings, crowns, implants, and bridges.   |
| Silver Diamine Fluoride | Treats and prevents caries progression.  |
| Tooth decay             | Dental caries.   |
| Topical fluoride        | It is a protective coating that is applied to the teeth to help prevent, arrest and even reverse early cavity formation. It strengthens teeth and slows or reverses demineralization. It is applied at a health care clinic by a dental provider. Fluoride varnish, a type of topical fluoride, can also be applied by a medical provider. |
| Xylitol                 | It is a sugar substitute that reduces tooth decay and reverses the process of early caries. It reduces decay-causing bacteria found in saliva.   |

# Dental Value-Based Models and Proposed Revision of Metrics for New York State's Quality Assurance of Preventive Dental Care

## Introduction

Dental care systems in the United States (US) have fallen short of preventing avoidable oral diseases and their consequences, despite enormous dental expenditures [9]. The shortfalls have increased the demand for new delivery models and approaches for oral healthcare [7]. Value-based care (VBC) is an effort to remediate rising health care costs, decrease the high rates of waste and reverse the non-communicable disease trends to achieve "value for money" [10]. VBC is often quantified as individuals' health outcomes divided by associated cost [9], [11]–[15]. Value increases when care delivery costs<sup>1</sup> are driven down while clinical outcomes<sup>2</sup> are improved or maintained [14]. Initially defined by the Institute for Healthcare Improvement, VBC evolved from the Triple Aim with three core goals 1) improvement of patient care experience 2) enhancement of population health 3) reduction of per capita costs of health care delivery. The vehicle to meet these goals includes operationalizing evidence-based, cost-effective, and quality-centric care, emphasizing prevention [16]. The goal of this paper is to discuss US dental healthcare systems' gravitation toward VBC, synthesize the available literature on dental value-based models, and discuss the need for quality metrics to help meet VBC goals. In addition, this paper will identify the needed metrics for New York State's (NYS) quality assurance of preventive dental care for Medicaid recipients 0-20 years of age.

## Section 1: Background

### 1.1 Tooth Decay is a Major Disease Burden in the United States

The 2000 Surgeon General report declared dental caries (tooth decay) a "silent epidemic" [1]. Dental caries is preventable, yet it is the most common chronic disease among children and adolescents in the US [2]–[6]. The prevalence of caries increases with age. According to 2011-2012 National Health and Nutrition Examination Survey data, 23% of children aged 2-5, 56% of children aged 6-8, and 96% of adults aged 65 years and older have tooth decay [17]. Low-income children are disproportionately impacted [18].

---

<sup>1</sup> The cost of service delivery is determined by the provider [14].

<sup>2</sup> Outcomes and costs are representative of a patient's total care cycle for a specific diagnosis. Outcome measurements may include quality metrics, patient satisfaction, or clinical outcomes [14].

Many factors that place patients at risk for caries are modifiable behaviors [2]. Risk factors for caries include frequent or prolonged exposure to dietary sugars [19], [20], inadequate oral hygiene practices or use of non-fluoridated toothpaste [20], drinking fluoride-free water, and early acquisition of cariogenic bacteria through transmission from saliva [21]. Poor diet, lack of physical activity, smoking, and overuse of alcohol are all modifiable health risk behaviors that are key drivers of chronic diseases' development and progression [7]. These behaviors are also risk factors for oral diseases.

When caries is left untreated, it can lead to pain and increased treatment costs [22] as well as increased risk for delayed physical growth and development [23]–[25], poor nutritional intake [26], restricted activity [27], decreased ability to learn [28], and diminished oral health-related quality of life [29]. In childhood, the consequences of oral disease include significant school absenteeism, substandard academic performance, and a greater risk of dental disease in adulthood [2]. In adulthood, 164 million work hours are lost annually due to poor oral health, a significant barrier to employability [2],[30].

Consequences of caries can also include emergency room visits and hospitalizations [31]. In 2009, preventable dental conditions contributed to 830,590 ER visits in the US [13]. Serious oral infections may result in more extended hospital stays due to delays related to needed surgeries. The delays have exacerbated conditions such as kidney disease, heart disease, respiratory disease, and diabetes, further extending hospital stays [13].

There is at least one death per year from caries-related treatment or complications related directly to the oral disease. Forty-four cases of child deaths were reported from 1980 to 2011 by one study and found that 73% of those cases were associated with restorative or tooth extraction procedures, and 68% were associated with moderate sedation or general anesthesia [15]. Though rare, death related to dental diseases and treatment is still a serious outcome [15].

Oral health enhances the quality of life in tangible ways, such as eating, tasting, smiling and speaking, and facial expressions that illustrate feelings and emotions [13]. Healthy People 2020 has also designated oral health as a leading health indicator primarily due to its interrelationship with general health [13]. However, oral disease is often overlooked when considering overall health and quality of life, even though its risk factors are common to many chronic diseases such as cardiovascular diseases, diabetes, cancer, and

pulmonary diseases [13]. The consequences of undervaluing oral health also impact mental health and socialization [32].

## 1.2 Economic Burden of Dental Diseases

Though the US has the most costly health care, it is reported to have the worst population health outcomes and measures of equity in comparison to any other high-income country [10]. Healthcare funding is getting increasingly strained from healthcare costs which are outpacing economic growth [7]. The growing treatment cost associated with oral diseases is concerning [2] and contributes to the economic burden.

Dental service expenditures increased from approximately \$2 billion in 1960 to 117.5 billion in 2015, which represents an average annual increase of 7.7%, surpassing the average inflation and economic growth rates for that period [7], [33], [34]. In 2013, for example, the total expenditure on dental care in the US exceeded \$111 billion [2], [35]. Most of the expenses were for restorative treatments that could have been avoided with early detection and/or preventive actions. \$2.1 billion was spent that year on oral complaints in the emergency department (ED), resulting in prescribing pain medication and antibiotics, which fail to address the underlying problem [2], [36]. According to the American Dental Association (ADA), 79% of those ED visits could be addressed in an outpatient dental office, resulting in \$1.7 billion in cost savings per year [30], [37]. Massive costs and economic burdens to the healthcare system also result from diabetes, heart disease, and depression which are directly associated with oral health [30], [38]–[41].

Rising costs and variable quality are two significant challenges the US healthcare system faces today. Increasing expenditures without parallel advances in public health “convinced stakeholders to request more transparency and accountability for their healthcare dollars” [42]. Due to the upward pressures in dental care spending, policymakers and payers are forced to call for fundamental changes to oral health care delivery. More recently, Cothron and Mcleod posit that the COVID-19 pandemic demonstrated how the current dental operating model is incompatible with the 21<sup>st</sup> century political, social, economic, and public health environment [32]. They suggest a reconfiguration of the dental care financing and delivery with outcome metrics and innovative workforce strategies in the short-term and policies supporting dental value-based care in the long-term [32].

### 1.3 Self-care Has Been Insufficient

Caries linked to inadequate oral hygiene, tooth brushing, and flossing has strong behavioral antecedents. Self-care through oral hygiene, a key health behavior for oral disease prevention, has been insufficient. Even though there is supportive evidence that caries risk can be reduced with systematic, twice-a-day tooth brushing with fluoridated toothpaste, this basic behavior is not practiced nearly as consistently or accurately as dentists and health organizations would like [7],[8].

Despite numerous educational efforts, the frequency and effectiveness of oral hygiene practices remain troublingly low [2]. An Adult Oral Health Survey from 2009 reported that 33% of men brush less than twice a day; meanwhile, 59% of women regularly skip brushing at bedtime [7], [43]. A randomized controlled trial found that 61% of the respondents were less likely to be "very much" sure that their children always had their teeth brushed twice daily. Seventy-one percent were confident that the child used fluoride toothpaste, and 80% felt it was necessary [8]. Furthermore, brushing twice daily may be ineffective if inappropriately done- if dental plaque is not successfully removed from all tooth surfaces, the functional value of tooth brushing is almost insignificant [7].

Oral hygiene behaviors are measured using the following indicators: dental plaque, periodontal inflammation, and caries coupled with self-report information [7]. The self-reported data from patients can be distorted from recall and social desirability biases [7]. Patients are not to be entirely blamed. Dentists and dental associations' recommendations on tooth brushing techniques vary, perpetuating confusion among patients [7]. The dental practitioners' inability to monitor patients' brushing behaviors in home settings results in a large gap between quality oral hygiene routines and individuals' practices [7]. Without the ability to detect non-adherence, dental practitioners cannot provide timely support and corrective feedback.

Conventional oral health education has been found to be ineffective and inefficient [18]. A systematic review and meta-analysis from 1996 of oral health educational interventions found a small positive yet temporary effect on plaque accumulation with no discernible effect on the increment of caries [18], [44]. Yet, studies showed positive effects in improving oral health knowledge and attitude [18], [44]. Similar findings were reported in a different review, which also concluded that successful dental education programs were labor-

intensive, grant-supported, and therefore unsustainable[45]. Clinical improvements were found to be "short-lived," and increased knowledge did not proportionately improve behavior [45]. There is little research on attaining positive behaviors over time, especially in high-risk families [18]. The expectation for changing patient behavior can be far-reaching; payers should therefore focus on evidence-based preventive dental treatments.

#### 1.4 Evidence-Based & Cost-Effective Preventive Treatments Exist but are Underutilized

In the US, oral care is among the greatest unmet health need [1]. NYS Medicaid's coverage for pediatric preventive and restorative care is comprehensive and robust. Dental coverage strengthens the feasibility of utilizing professional dental care. Professional dental care is effective in caries risk reduction and can improve oral health and well-being [46]. A preventive dental visit should consist of oral health counseling and preventative dental treatments. Anticipatory oral health guidance and counseling strengthen access to information on dental disease prevention, caries risk factors, and consequences [43]–[45]. Caries prevention therapies include sealants, topical fluoride, chlorhexidine, and xylitol [18]. While chlorhexidine and xylitol can be prescribed, dental sealants and topical fluoride are administered by a clinician. These agents are evidence-based in caries prevention and cost-effective compared to restorative care [18], yet they are underutilized.

Preventive interventions can slow, arrest or even reverse the progression of caries, which can have a long lead time [2]. Evidence for prevention of early childhood caries includes starting early, before the first tooth or first birthday [18]. The utilization of high-quality professional dental care starting from an early age can considerably decrease the incidence of caries over the life course. Preventive dental services are relatively low cost and can avoid high-cost treatment [8]. Value-based oral health care is a significant element of the future. It shifts focus to prevention from restorative care, emphasizing early intervention and disease prevention while promoting minimally invasive procedures [8]. With this shift, healthcare systems could produce better health outcomes and patient experience at a sustainable cost.

Conventional restorative treatment for caries is a compounded problem that is costly, inefficient, inequitable, and prone to failure. According to Edelstein, it's "a situation that is increasingly untenable in an era of value-based purchasing" [18]. Preventive dental services can achieve better health outcomes for populations,



enhance the patient experience, and decrease per capita costs. However, preventive dental services are not maximized by dental practices nor widely promoted by dental plans [47]. Dental sealants are clinical and cost-effective as a caries prevention and arrest agent [16]. The effectiveness is supported by compelling evidence and a systematic review [16], [48], [49]. According to the Centers for Disease Control and Prevention (CDC), sealants prevent 80% of tooth decay in the back teeth, where 9 in 10 cavities occur, for two years and continue to protect against 50% of cavities for up to four years [47], [50]. The cost of placement of sealants is one-third of the cost of treating tooth decay [16]. ADA and the American Academy of Pediatric Dentistry (AAPD) recommend including sealants in comprehensive caries management plans for patients. The use of sealants became even more profound during the COVID-19 pandemic, which resulted in recommendations for non-aerosolizing interventions (such as sealants) and to use aerosol treatments as a last resort only [51].

Despite the support from relevant associations (e.g., ADA, AAPD, and CDC), numerous educational programs, and mounting evidence since 1976, that sealants are safe and effective in preventing caries, their utilization is low. The 2009 NYC Child Community Health Survey found that among children ages 6 to 12 years, 65% (438,000) never received sealants [52]. Sixty percent (352,000) of children ages 6 to 12 years had a preventive dental visit but never had sealants placed [53]. The percentage of Medicaid children 6-14 who had a sealant placed on a permanent molar in 2013 was 14% nationally and 11% in New York State [54]. Children from low-income families are 15% less likely to get dental sealants and twice as likely to have untreated caries than children from higher-income families [55].

Topical fluoride has a substantial caries-inhibiting effect in the primary and permanent teeth. It reduces harmful bacteria, remineralizes non-cavitated lesions, and is quite effective in halting the eruption of new caries. Topical fluoride decreases the incidence of caries by 43% [56]. It protects the teeth for several months and works best if reapplied every three to six months. Topical fluoride is cost-effective [57]–[59]. One study reported a cost savings of \$41.15 per application of this preventive treatment [58]. A different study reported a cost-savings of \$75.32 per child for Virginia Medicaid by averting restoration costs [59].

### 1.5 VBC Aims to Strengthen Quality of Dental Care and Cost-effectiveness

The basis of caries management is to reduce the morbidity and progression of the disease, goals that reduce the future need for restorative services and associated costs. The US reimbursement structure primarily rewards restorative treatment rather than prevention; providers are rewarded for doing more over doing less or better [60]. Traditionally, healthcare financing has focused mainly on payment for transactional, procedural care (fee for service) [10]. The dental health care system is not much different. The FFS system currently impedes caries management by rewarding restorations over prevention and more convoluted or intensive treatment over less invasive ones for disease management [15]. Multiple professional organizations are pushing to move from transactional procedures to rewarding disease prevention and slowing tooth and tissue mortality [11]. Several organizations, including the US Department of Health and Human Services (HHS) and CMS, recognize the need for payment reform. A shift in focus is needed from being rewarded for the volume of care to value-based models of reimbursement that reinforce cost-effective care and quality outcomes [7].

FFS incentivizes treatment volume rather than outcomes, with little regard to the costs of care [61]. Clinicians may therefore be inadequately incentivized for value-promoting activities [61]. Consequently, they may be hard-pressed to consider the financial implications of a patient who chooses to decline a more expensive and/or more profitable (from the provider's viewpoint) treatment choice. How a provider frames the best-available evidence may be influenced by such subconscious biases.

In 2015, HHS Secretary Sylvia Burwell testified to the Senate that: "[FFS] has been blamed for medical costs that have continually outpaced normal inflation..." She also stated CMS's commitment to move to value-based payments (VBP) in Medicaid [47]. Given the lack of sustainability of the current FFS model, VBC modeling seeks to review alternative, cost-effective reimbursement structures [7].

Deloitte LLC defined VBP as a payment methodology that rewards quality of care through payment incentives and transparency in a health care delivery system. A system is set in place based on rewards and consequences, "conditional upon achieving pre-specified performance measures." Providers are held accountable for the expense of servicing and the quality they provide. The incentives should discourage unnecessary, inappropriate, and costly care [47]. VBP models aim to strengthen the cost-effectiveness of

dental procedures by decreasing the financial incentive for clinicians to perform excess services and procedures per patient, especially when the evidence of improvement in clinical outcomes with the service is uncertain [62]. Patients (consumers) can also be incentivized to strengthen the utilization of preventive services. A focus group of dentists, researched by DentaQuest dental HMO, reported the lack of patient compliance (e.g. insufficient utilization of dental services) was the key reason for low uptake of topical fluoride (39% only) among a medium to high risk for caries population [47]. To test this theory, the dental plan instituted a financial incentive for this patient population and observed an increase of topical fluoride application to 60% [47]. Therefore, the lack of patient compliance is not the only justification for why this treatment was underutilized [47], and incentivization was seen to strengthen the utilization of the preventive treatment.

## Section 2: Oral Health Value-Based Care Initiatives- A Synthesis of Published Initiatives

### 2.1 Methods for Narrative Review

Value-based oral health care emphasizes early intervention and disease prevention while promoting minimally invasive procedures [8]. A narrative review was conducted to identify and review the available literature on VBC in oral healthcare. Other published and gray literature was reviewed for technical information (e.g., dental therapies, design of value metrics) and has been incorporated in sections 1, 3, and 4 of this paper. This section, the narrative review and synthesis, aims to collate existing oral health value-related incentives and metrics initiatives. The following terminologies were searched in PubMed in November 2020, ("value-based" OR "value based") AND ("oral health" OR dental"), resulting in 69 abstracts. Inclusion criteria included English language, a sample aged 0-20 years, and mention of caries. 23 articles were excluded because they did not meet the inclusion criterion or were unrelated to the subject matter. The remaining 46 articles were classified according to their most prominent themes and fell into four groups<sup>3</sup>: Initiatives strengthening inter-professional collaborations, those increasing use of mid-level providers, those capitalizing on new technology, and those promoting care/case management to strengthen the utilization of care. These four types of initiatives are described and synthesized in turn below.

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<sup>3</sup> Note, some initiatives encompassed one or more of the themes and were categorized based on the theme that was most prominent in the initiative.

## 2.2 Initiatives that Leveraged Inter-professional Collaboration for Value-based Care (VBC)

Traditionally, health care providers have practiced in silos [10]. Patients are separated by health conditions and social challenges- an unintegrated, and unholistic approach in providing care. This has resulted in fragmented services and a lack of care coordination, leading to serious mistakes, duplication of services, unnecessary expenditure, patient dissatisfaction, and poor health outcomes [13]. VBC promotes a shift from episodic acute care to one that is integrated, team-based, and prevention-focused [13], [16]. It also promotes untraditional care delivery approaches, such as leveraging medical providers for dental services and vice versa.

VBC focuses on whole-person care, and for primary care physicians (PCP), that would mean to also address vision, hearing, dental and social services [10]. Even though the uptake may be low [63], medical providers can partake in dental health by screening the oral cavity, applying fluoride treatment, educating, and referring. In some jurisdictions, PCPs learn to administer dental anesthesia and tooth extractions [10].

Leveraging mid-level providers for care delivery is a viable means of integrating preventive dental services into medical clinics and curtailing siloed care delivery. Furthermore, cost-effectiveness can be improved if low(er) cost labor is utilized, such as dental hygienists, dental therapists, and community health workers (CHWs) so long as they have the requisite expertise. Dental hygienists and dental therapists can conduct risk-based assessments, oral health education, and preventive and therapeutic services to prevent and control diseases. While both dental hygienists and therapists can provide comprehensive preventative dental treatments, dental therapists can also conduct select restorative services. Both providers can systematically screen for early onset of oral and chronic diseases, even before symptomology, allowing timely interdisciplinary management between medical and dental communities [7]. They can be utilized at dental and medical appointments to help prevent and manage chronic conditions and common risk factors such as alcohol use, tobacco use, and poor diet [13]. These clinicians are considered a cost-effective workforce given they're salaried at a lower level than a dentist and can deliver preventive and therapeutic interventions without a dentist on-site. They can use telehealth and make appropriate referrals to dentists, physicians, and/or specialists. CHWs can strengthen provider-patient communication, conduct caries counseling, strengthen the utilization of preventive care, treatment adherence, follow-up, and referral, and

promote self-care [18]. An amendment to 2014 Medicaid federal regulations allowed CHWs to be reimbursed directly by Medicaid under the delegation authority [18]. Integration of oral health services into medical visits may increase awareness on dental care and motivate patients to become accustomed to overall health status. This may also push patients to look to dentists for essential oral health services instead of perceiving dentistry as an elective, esthetics-oriented service focused on teeth whitening and alignment [12]. In the remainder of this section, I will provide examples from literature on programs that have utilized inter-professional collaboration to meet VBC goals.

2.2.1 The first example is Boston Children's Hospital's Early Childhood Caries Collaborative (BCH ECCC). It has promoted inter-professional collaboration by utilizing medical providers for caries risk assessment, fluoride application, and interim therapeutic restorations (ITR) [47]. ITR arrests caries activity, reduces tooth pain, and decreases the need for urgent dental interventions. Their pre-post observational study with historical controls found a decrease in new cavitation by 43-65%, a reduction in reported pain by 38 -77%, and lessened treatment in the operating room by 40-48% [47], [64]. Prevention is cost-reducing. Health economists found that BCH reduced the per capita expenditure of treating their patient population with early childhood caries by 38 percent [47].

2.2.2 The Yakima Valley Farm Workers (YVFW) clinic has an incentive-based salary matrix which has resulted in "much higher" productivity, access, and treatment completion rates than the national average [3]. As part of their model, they embedded trained community dental health coordinators (CDHC) who are also licensed dental hygienists into their medical primary care teams. The CDHS accessed children 0 to 5 years in the medical clinics, evaluated their oral health, and applied fluoride varnish and/or silver diamine fluoride (SDF) [3]. SDF treats and prevents caries progression. Questions embedded into the clinic EMR asked caregivers if their child had a dental home. Children needing additional oral care were referred to the Yakima Valley dental clinic and case managed.

The YVFW's initiative improved ready access to medical and dental providers who were available to offer consultation when needed [65]. Pediatric physicians and nurses were trained to apply fluoride varnish during a routine medical visit for children at risk for caries. Dentists'

participation in advisory and decision-making task force was made mandatory, "so that issues that could impact oral health care are considered in decision-making" [65]. YVFW adopted the Dental Quality Alliance metrics but planned to expand its quality dashboard to make and track the needed quality improvements [3]. Their quality metrics can be found in Table 1.

| Table 1: YVFW Quality Metrics [3]   |
|---|
| <ul style="list-style-type: none"> <li>• Dental Sealant Percentage children 6–9</li> <li>• Dental Sealant Percentage children 10–14</li> <li>• Caries at Recall</li> <li>• Topical Fluoride for Children at Elevated Caries Risk</li> <li>• Caries Risk Assessment</li> </ul> |

Grant funds partially supported this initiative. The funds supported the start-up expenses of training, equipment, and a portion of the hygienists' salaries. The permanent placement of hygienists in medical clinics and the development of a dashboard for benchmarking sustained their efforts upon depletion of the grant funds and before the COVID-19 pandemic interrupted services [3].

2.2.3 Delta Dental of Minnesota, in collaboration with medical insurance partners, administers and reimburses diabetes and hypertension screenings in a dental office in order to tap into the "millions of Americans" who were undiagnosed and were not going for routine physical examinations but were making regular dental visits [13].

### 2.3 Initiatives that Leveraged Information Technology for VBC

2.3.1 In 2005, the CMS created a physician group demonstration project offering 10 large practices the opportunity to earn performance payments for strengthening the quality and cost-efficiency of healthcare delivery. Marshfield Clinic Research Institute in Wisconsin (MCHS) was among the participants. MCHS has long been a health information technology pioneer [16]. Their HIT/EMR was developed in the early 1980s and was a physician-led design. It created a paperless environment and a data warehouse for real-time patient data. As a participant in the demonstration project, MCHS developed a dental clinical quality dashboard, to track quality care delivery and meet preventive care benchmarks [16].

As part of their Dental Quality Improvement Initiative under the Demonstration Project, MCHS developed dental health indicators to strengthen VBC delivery. Across ten dental practices, definitions of trends surrounding key clinical and operational performance metrics were developed to track center and dentist-level performance and percentage of performance improvement. A cross-functional steering committee was established to evaluate the oral health quality metrics, including one on sealant placement and caries risk

assessment, defined by the National Network for Oral Health Access (NNOHA) and Health Resources and Services Administration (HRSA) [16]. This real-time visual and analytical platform allowed for systematic, timely evaluation and communication of relative progress towards the preventive care benchmarks[16]. The application of informatics and quality tracking resulted in the delivery of high-quality care at a reduced cost [16].

Sealant placement was prioritized for caries prevention or reduction by the dental practices. Through MCHS's initiative, 73% (5678/ 7761; range: 71.1-74.7 percent) of qualified patients 6-9 years of age at moderate to high risk for tooth decay received a dental sealant between 2016-2019. There was an incremental increase in sealant applications in the eligible population; the subsequent years had rates of 86% and 88%, respectively [16]. Compared to the other CHCs, the dental practices consistently exceeded sealant placement rates in a population with elevated dental caries risk and a disproportionately high representation of Medicaid-eligible patients (4-year mean: 87%). National and state CHCs reported a sealant application rate of 49% and 60% between 2016-2019, respectively [16]. This initiative documented the "achievability" of high sealant application rates in the Medicaid population, contributing to VBC delivery [16]. The majority of the sealant applications were performed by dental hygienists [16]. The success was primarily due to the emphasis on "same-day placement" for appointed patients, clinical staffing with adequate hygienist: dentist ratio, motivated clinicians, and quality tracking informatics which allowed for performance feedback [16].

MCHS was deemed the most successful participant in CMS's Physician Group Practice demonstration project. Over five years, MCHS was rewarded with 57 percent of the \$107.6 million in gross savings. The funds were distributed among ten participating institutions based on performance [16]. The monetary reward was to further incentivize them for dental quality improvements.

2.3.2 The HealthPartners of Minnesota deemed their EHR a critical element in the achievement of their medical and dental integration. The integration, facilitated by a shared EHR, provides the patient's photograph, demographics, vitals, access to the medication, allergy, and problem list, health directives, identification of their care team, recent and upcoming visits, preventive health needs, and other facts relevant to their overall health. Providers can communicate with one another across the organization, act

on relevant aspects, and coordinate services, which has resulted in safe and timely care [65]. Patients expressed appreciation for the efficiency in scheduling their care, for the collaborative practice between dental and medical providers, and for dental providers' access to their medical information. While an evaluation is pending, HealthPartners anticipated that the better care coordination through the integrated EHR would result in higher quality care and lower health care costs [65].

#### 2.4 Initiatives that Leveraged Care/Case management for VBC

The Affordable Care Act's push for value-based purchasing motivated rural health clinics (RHC) in Iowa to provide patient-centered services, including case/care management and care coordination. The majority of the RHCs surveyed provided patient-centered services either directly or by referral [66]. Among the 90% of the RHCs, 63.2% reported their ability to provide or refer for dental services to be adequate [66]. They strengthened their ability to evaluate health data to identify high-risk patients for more targeted case management and interventions, but only a minority reported conducting data analysis at their clinic.

#### 2.5 Initiatives that Leveraged Dental Metrics for VBC

2.5.1 A retrospective cohort study among 6-14 year olds treated at the University of California, San Francisco, and the University of Texas- Houston dental schools during January 2016 to December 2018, assesses the cost-effectiveness of "sealing" patients at low risk of tooth decay. The administrators integrated the following metrics into their EHR: 1) caries risk status (Table 2). 2) caries outcome as defined as the incidence of new decay [67]. For each tooth, the new caries experience was categorized as DMF-

A formerly healthy tooth is either now cavitated (D), has been filled (F), or was extracted (M) due to decay [67]. 3) provision of sealants on sealable teeth. A sealant-eligible tooth was defined as an erupted permanent molar that was not carious, restored, or previously sealed.

| Table 2: Caries Risk Determination [67]  |                          |                       |
|--|--------------------------|-----------------------|
| Caries risk assessment (CRA) form, an evidenced-based, validated tool developed at the University of California San Francisco, provides clinical decision support for providers. | Diagnosis of caries risk | Dental Procedure Code |
|  | Low                      | D0601                 |
|  | Moderate                 | D0602                 |
|  | High                     | D0603                 |

No statistically significant difference was found in new caries incidence among patients aged 6-14 at low caries risk who had a sealant placed versus those who did not. The cost was \$70.00/per tooth/ per sealant.



If the teeth of the low-caries risk sub-group were not sealed, there would be a total cost savings of \$163,030 and 365 hours of clinician time over three years [67]. This result embodies a low-value care scenario where sealant application to a low-risk population has no statistical impact on caries (it did not prevent more caries), yielded unnecessary treatment costs, and was not cost-efficient. There was cost-effectiveness and significant difference in decay between sealed and unsealed teeth for each elevated category of a moderate, high, or extreme caries risk. This study recommends the application of risk adjustment in dental quality metrics for a cost-effective impact [67].

2.5.2 South Carolina developed a sealant quality metric for its state Medicaid dental program for VBC. A single county analysis was conducted using Medicaid claims data for accessibility, affordability, and consistency in format. In addition to the sealant application rate, they also assessed whether a clinician's care delivery met the clinical standard of care when a sealant-eligible tooth was identified during a preventive dental visit [51]. Only 11% (460/4112) of the eligible teeth were sealed. They found that extraneous influences such as social determinants of health, enrollment eligibility criteria, and health plan policies impacted service utilization patterns. They concluded that these factors are beyond the influence of dental clinicians and should not be considered in payment-related algorithms. They further argue that social determinants confound the relationship between quality and outcomes; therefore, a VBC model should equate quality to provider performance rather than the prevalence of patient outcomes or risk. They suggested applying sealants during the first preventive dental visit as opposed to a subsequent visit and leveraging alternative payment models to incentivize sealant application.

2.5.3 At Willamette Dental Group (WDG), when a dentist must intervene surgically, it is considered a failure of prevention [1]. WDG has a model that incentivizes compensation aligned with performance indicators [1]. They utilize POC, AOC, and OOC metrics (Table 3.) and aggregate them into patients' oral health reports. The report also includes caries risk, oral health status (e.g., untreated decay, new decay), self-care techniques (e.g., prescription fluoride toothpaste), and office preventive care (e.g., fluoride varnish) [1]. To evaluate their program, White et al. conducted a retrospective study with cross-sectional measures

from electronic health records of members enrolled in WDG (the average number of members enrolled per year was 441,631) between 2014 and 2019. White et al. found WDG's value-centric, evidence-based preventive, and accountable model of care demonstrated "excellent" dental provider adherence with measurably better oral health outcomes by patient risk compared to national estimates [1].

Given the standardized approach in data collection and data-informed interventions, the author considers this a value-based method to care advancement, resulting in better health care, lower cost, and an engaged workforce. A survey showed that the initiative was well-received by both patients and providers [1]. The author concludes with a recommendation to

| Table 3: Metrics used at Willamette Dental Group [1] |   |
|--|---|
| <b>Patient-Level</b>                                 | <ul style="list-style-type: none"> <li>Members enrolled</li> <li>Visits</li> <li>Patients with an exam</li> </ul>   |
| <b>Process of care (POC)</b>                         | <ul style="list-style-type: none"> <li>Medical and Dental history</li> <li>Vital signs</li> <li>Extra/intraoral examination</li> <li>Self-reported oral hygiene/nutrition</li> <li>Findings of demineralization and decay</li> <li>Existing restorations</li> </ul> |
| <b>Appropriateness of care (AOC)</b>                 | <ul style="list-style-type: none"> <li>Radiographic recall interval</li> <li>Radiograph planned/taken</li> <li>Fluoride varnish</li> <li>Silver diamine fluoride applications</li> <li>Procedures in phase</li> </ul>   |
| <b>Outcomes of care (OOC)</b>                        | <ul style="list-style-type: none"> <li>A validated tool is used to assess untreated and new caries. Number decayed, missing, or filled permanent teeth and tooth surfaces.</li> </ul>   |

amend reimbursement structures by attaching monetary incentives to performance indicators to help achieve VBC goals [1].

## 2.6 Challenges in Dental VBC

### 2.6.1 Requirement for interdisciplinary and interoperability

With shifts toward pay-for-performance, the reimbursement may be at a single rate conditional on the patients' outcomes, requiring both care and financial coordination by interdisciplinary teams. Implementation of incentives and penalties may create adversarial relationships between clinicians and hospitals, where each entity may attempt to capture value for itself [68]. Value improvement may not be credited appropriately, and the overall cost and quality may not strengthen the system, potentially resulting in a zero-sum game [68]. More accurate methods are needed to cost provider-level time and resource usage [68]. This would require individual specialties to conduct cost ascertainment and determine their 'value-add' to negotiate fair compensation. [14]. Abbott et al. suggest uniting traditionally nonintegrated providers through strategies that measure quality and costs across the continuum of care before the change is forced by financial pressure [68]. This integration would necessitate standardization of care protocols,

system-level cost, and quality measurement, appropriately targeted quality improvement efforts that deter cost-shifting, coordination of care for more substantial outcomes, and reduced duplication of effort [68].

Cost is an essential variable in the assessment of VBC. Cost ascertainment can be more challenging when shared information technology between clinics is lacking. Multiple data sources may be needed to derive the final figures, which is labor-intensive and unsustainable, illustrating the need for interoperable systems. For example, although hospital costs may be determined at a line-item and patient-specific level, the physician cost accounting systems may not be as sophisticated, requiring conversion of charges for cost estimation [68].

### 2.6.2 Too Many Stakeholders Involved

Multiple stakeholders may take part in deciding on performance indicators. Stakeholders include patients and consumers, employers, trusts and unions, brokers and insurance benefit consultants, insurance carriers, dentists and dental staff, organized dentistry groups, research and teaching institutions, and federal, state, and local regulators [69]. The more stakeholders involved, the more complex it can be to identify and administer a VBC arrangement.

Another challenge is resistance to change, especially when there are numerous stakeholders. Every industry copes with change management, and caries management is a change that affects every stakeholder involved [15]. Effective communication can make change management successful. To integrate VBC performance indicators, clear communication is needed on its importance, anticipated improvement in oral health outcomes, and how it can be incorporated into the dental health system. For instance, an insurance benefits advisor may need to understand how caries management can decrease client costs, an employer may be concerned with how it might impact employee absenteeism, a wellness vendor may want to know the effect on comorbidities, a clinician needs to understand the impact on office resources and income, and government plan administrators may need to know the impact on access and utilization [15].

### 2.6.3 Variation in Dental Treatment Modalities

There is a sizable variation in dental treatment modalities [70]. The variations could be due to inadequate payment structures, clinicians' resistance to change, patient/clinician inability to make the best use of evidence, and limited evidence-based recommendations.

2.6.3.1 Inadequate payment structures: Variations in treatment modalities exist when conditioned on payment structures. Treatment decisions have significant cost implications [42]. Payers or providers may not promote preventive dental care under the current FFS and dental business models [47]. While the objective is to shift from volume to value, the challenge is to identify which payment model best suits a given type of care, practice type, care setting, and geographic location and then appropriately administer it [71]. There may be economic and operational challenges. In 2014-16, Affordable Care Organizations in the US were surveyed in a cross-sectional study. The study found that a shared savings program did not offset the loss of FFS revenue [72]. An adequate payment delivery model would be required to implement incentives that truly "incentivize" providers.

2.6.3.2 Resistance to change: Clinical inertia, defined as "recognition of a problem but not acting to treat or prevent the problem in the desired manner based on current evidence," could be a possible explanation for variations in treatment modalities and may contribute to the delays in large-scale administration of recommended care [70]. For example, despite overwhelming evidence about the effectiveness of sealants, their utilization varies greatly among dentists. The way early caries are treated also varies substantially, despite evidence that remineralization through fluoride of caries enamel is longstanding [70]. Similarly, prophylactic extractions in the third molar continue to be recommended despite evidence against this intervention [70].

2.6.3.3 Inability to make the best use of evidence: Patients and their clinicians are not usually qualified to identify and synthesize the relevant evidence or conduct the necessary economic evaluation of the value of competing healthcare interventions [1]; this may also induce variation in treatment modalities. White et al. say that VBP has been conceptualized in dentistry, but the empirical studies demonstrating this approach are few, partly because of traditional surgical procedures and the FFS delivery model, which leaves providers ill-equipped to manage or measure population-level outcomes [1]. Furthermore, Koka and Raz

argue that dentistry has ineffectively assessed cost-effectiveness compared to medicine which has mounted evidence from cost-effectiveness, cost-utility, and cost-benefit studies [60]. The cost-effectiveness of sealants and fluoride, however, is well documented [16], [47]–[49], [57]–[59].

2.6.3.4 Absence (or gaps in) of VBP Evidence base: When resorting to the recommendations of governmental and professional organizations there are a limited number of evidence-based (EB) recommendations for dental care. For example, of the 159 EB practices reports developed and posted on its webpage by The Agency for Healthcare Research and Quality (AHRQ), only one is related to dentistry<sup>4</sup>and it reported insufficient evidence [42]. The US Preventive Services Task Force, an independent panel of subject-matter experts in primary care and prevention, rates the strength of evidence for a preventive service and submits recommendations. Of the 103 recommendations posted from 1992 to 1996, only two were dentistry-related [42]. Of the two, only one<sup>5</sup> was rated to have sufficient evidence to recommend the intervention. Similarly, many of the 82 oral health-related topics were found to have insufficient evidence by the Cochrane Collaborative Group. Despite the challenges in recommending EB practices, applications of sealants and fluoride are two of the three endorsed EB practices by the ADA [42].

#### 2.6.4 Challenges in Developing Appropriate Metrics

Edelstein and Donoff from Columbia and Harvard Universities, respectively, both independently contend that dentistry is not positioned for VBC implementation because of a lack of valid and reliable treatment outcome indicators and assessments [73], [74]. To achieve this, Edelstein suggests professional guidelines and quality metrics with clear objectives, definable units of assessment, analysis, and interpretation of performance data, as well as performance standards and financial rewards [73].

There are several layers of complexity in establishing a well-thought-out set of performance indicators that incorporate all relevant oral health outcomes, including the perspectives of all relevant stakeholders[9]. Inclusion of all relevant oral health dimensions for assessing oral health outcomes may be challenging due to needed resources, cost, and/or scarcity of time. Various oral health use cases may require outcome

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<sup>4</sup> Effectiveness of Antimicrobial Adjuncts to Scaling and Root Planning Therapy for Periodontitis

<sup>5</sup> Primary care clinicians prescribe oral fluoride supplementation at currently recommended doses to preschool children older than 6 months of age whose primary water source is deficient in fluoride.

indicators whose validity has not been empirically tested [9]. Additional criteria for developing metrics include time variance (e.g., orofacial pain has more fluctuation than tooth loss).

Chronic dental conditions do not have established severity markers, as do many chronic medical conditions. For diabetes management and hypertension, the hemoglobin A1C level, and blood pressure, respectively, are established indicators of disease control [42]. Such indicators do not exist for the management of dental caries. This makes the development of outcome indicators challenging in dentistry. Furthermore, caries can progress gradually, and several dentists may treat them over decades [42]. Currently, there are limited clinical dental outcomes indicators; decayed, missing, filled surfaces, periodontal index, gingival bleeding index, and oral hygiene index are among them [42].

### Section 3: Moving the Needle towards VBC in New York State

#### 3.1 Preventive Dental Services are Disruptive Innovations

Surgical care has been the main value proposition for dentists- instead of preventive care. Financial reimbursement is much greater for surgical treatments like crowns and root canals than preventive services [47]. While not dismissed by dentists, disruptive primary, secondary, and tertiary preventions are not maximized. Disruptive innovation is the treatment of non-cavitated, demineralized surfaces of teeth with fluoride which promotes remineralization [47]. It is also sealing pits and fissures, which significantly prevents debris collection and incidence of new decay. The use of fluoride and sealants are among the evidence-based recommendations by the ADA which makes EB clinical recommendations in only three areas: (1) prevention of infective endocarditis, (2) use of sealants, and (3) professionally-applied topical fluoride [42]. The utilization of fluoride and sealants is low among children. In this section, I would like to reemphasize the underutilization of sealants and fluoride and the need to shift from a reactive to a preventive system as a segue to our next section which proposes a revision to NYS's quality assurance of dental care.

While dentistry likes to pride itself on having preventive services, the data may not bear that out [47]. When dental sealants were approved as safe and effective in preventing caries in the pits and fissures in 1976, specific objectives were put in place for sealant application. Healthy People 2000 and 2010 objectives pushed for a prevalence of sealants of 50 percent on at least one permanent molar for children up to the

age of 14. Reaching this goal was elusive. Healthy People 2020 then set the target for sealant placements for adolescents 6–9, which is when the first molars erupt, and 13-15 years of age, which is when the second molars erupt, to 28.1 and 21.9 percent, respectively [67]. Nationally, only 16 percent of 6-9 year-olds on Medicaid received sealants in 2013 [47], [75].

For decades, dental professionals have known about the success of remineralization through fluoride. Yet, its utilization is not standard practice, nor are some forms of fluoride covered by benefits providers. However, restorations may be a covered service and have an increased likelihood of future caries compared to fluoride-enhanced, remineralized enamel (tooth surface). Remineralization through fluoride is an easily applicable innovation and a less expensive treatment of better quality [47].

Both treatments, when combined, result in an additive preventive effect. One split-mouth trial of 92 children at a two-year follow-up found a significant difference in favor of resin-based fissure sealant when applied with fluoride varnish in comparison to fluoride varnish only (OR 0.30, 95% CI 0.17 to 0.55) [76], [77]. Theoretically, an additive effect seems entirely plausible since both sealants and fluoride prevent tooth decay but in different ways. While sealants hinder the collection of germs and food from the grooves in the back teeth by covering them with a safe protective shield, fluoride protects against cavities on all tooth surfaces by making teeth stronger [78].

There is widespread agreement in the literature reviewed that the current dental economic model is a reactive system that predominantly treats and manages dental disease after it is established. The model needs to shift towards prevention [7], with an enhanced focus on sealants and fluoride. Edelstein argues that restorative treatments are "neither inherently effective nor cost-effective at preventing caries progression" [18]. He says, "Dental repair, in the absence of intensive, effective, and sustained behavioral risk reduction interventions, are short-lived as dental restorations, except for glass ionomer fillings, are not therapeutic and restorations frequently fail"[18]. The literature reports tooth decay recurrence rates of 22% to 79% at 6 to 36 months post-treatment among children treated for early childhood caries under general anesthesia [79]–[85]. Restoration failure mounts to the problem of caries progression as Amin et al. report that 32.9% of restored teeth required further treatment over a three-year follow-up, and 8% of children

needed a second dental rehabilitation under general anesthesia [86]. For preventive services, timing is key. Early intervention during childhood can yield significant returns over the life course [8], [87].

### 3.2 Value Metrics Can Be a Vehicle to Strengthen Utilization of Preventive Dental Services

Value metrics are central to VBC and VBP approaches. The indicators can be used to evaluate initiatives and services, the information from which can drive improvement [61]. When metrics become a necessary component of service delivery, they can considerably strengthen the quality of care, dose, and fidelity. Therefore, value metrics can play a significant role in driving the utilization of preventive dental services, in particular, the application of sealants and fluoride. While initiatives in the peer-reviewed articles leveraged value metrics for the assessment of their programs, no studies among the 46 articles evaluated statewide governmental quality measures' effectiveness for VBC. Gray literature was therefore utilized to identify tested and scalable dental metrics. The gray literature reviewed was predominantly from professional organizations, conference proceedings, government agencies, and non-governmental organizations. The benefits of value metrics and the search results on tested and scalable value metrics will be discussed further in the next section of this paper.

### 3.3 The Challenges Can Be Addressed

New York State Department of Health (NYS DOH) can shift towards VBC by strengthening the utilization of preventive dental services through value metrics and by ultimately addressing the challenges mentioned in the preceding section. While there are too many stakeholders, as the prominent regulating entity, the Office of Health Insurance Programs (OHIP) at the NYS DOH can work in partnership with the Bureau of Quality Measurement and Evaluation to amend their existing performance metric set, Quality Assurance Reporting Requirement. NYS DOH is the regulatory authority of the Insurance Providers who are contracted with dental providers (DHMOs and dental clinicians) across the state. NYS DOH can incorporate key preventive dental metrics into QARR that can be assessed through Medicaid claims data, which would ensure data standardization and harmonization across providers. They can institute P4P using the QARR standardized performance metrics and attach bonus payments to insurance providers' premiums. By incorporating tested and validated preventive dental indicators into QARR, they would minimize the burden of having to identify appropriate metrics. NYS DOH can also decrease variations in treatment modalities



through these metrics, as providers would then be held accountable for having to meet the benchmarks assigned to them and feel impelled to provide the necessary service that the metrics require. The next section discusses each of these suggestions from this paragraph in much greater detail. The section also describes the steps NYS DOH OHIP can take to develop a dental metric set aimed to assess and improve the utilization of preventive dental care. Each 1-10 step ends with a recommendation for the Health Department. It is followed by a final set of recommendations with technical details on the needed amendments/additions for a more robust metric set to improve NYS's quality assurance of preventive dental care.

#### Section 4: Strengthen Use of Dental Metrics to Improve Utilization of Preventive Dental Services for NYS's VBC

##### Ten Recommended Steps for NYS DOH

#### 4.1 Define Value from the Perspective of the Patient

William J. Mayo famously stated: The patient's best interest is the only interest to be considered [60]. Consumerism has increased, and dental practitioners and payers need to match patient experience with consumer expectations. Value-based dentistry should apply the best available evidence to meet patient-centered objectives in the context of biological, financial, and time costs relative to the duration and degree of therapeutic benefit [42]. Consumers today expect a level of service from healthcare commensurate with other products and services [10]. Patients seek value and positive experiences as they select their dental practitioners and actively "shop" for health care services [7]. They are accustomed to a digital world and are more likely to research health issues, use the internet to share information on health providers, and partake in self-management of their health [7]. With the shift towards consumerism, patients will demand more transparency on their dental care money [7], [15]. Increasingly, a patient's decision is based upon therapeutic benefit and cost [7]. These trends are projected to intensify with gen Xers [88]. The change would mean more seamless and personalized interactions, ready access to information on the cost and quality of dental service, comparative effectiveness of services, and involvement in treatment decisions [7].

**Recommendation for NYS DOH Office of Health Insurance Program (OHIP):** NYS's performance metrics for VBC should attempt to encompass patient-perceived values. Sealants and fluoride are effective low-cost options for dental disease prevention and hold strong patient-perceived value.

#### 4.2 Select Tested, Specific and Measurable Metrics

The assessment of quality is a prerequisite for quality improvement. Historically, clinical quality has been ascertained by three approaches: direct patient evaluation by a trained observer, chart review, and quality metrics [67]. Direct evaluation and chart review can be subjective and time-consuming; in contrast, value metrics such as dental quality measures (DQMs) are considered more objective. Value metrics can be measured at an individual or population level. They can inform 1) continuous quality improvement of dental care delivery based on patient outcomes pre and post-treatment 2) interprofessional collaboration for early detection of non-communicable diseases in dental settings and dental ailments in medical settings 3) pay for performance with rewards for dental providers based on patient population's oral health maintenance 4) public health programs to identify initiative effectiveness and areas of improvement 5) needs-based planning for a tailored approach in care delivery 6) monitoring to allow comparisons of dental care systems [9]. Over the years, dental metrics have evolved and are increasingly supported by local and national organizations. There are two leading developers of dental metrics. They are the National Committee for Quality Assurance (NCQA) and Dental Quality Alliance (DQA). Their measures are endorsed by the National Quality Forum.

The NCQA is a private, nonprofit organization that develops performance metrics and quality standards for health care. Healthcare Effectiveness Data Information Set (HEDIS) performance indicators designed by the NCQA are used by more than 90% of health plans and consist of 90 metrics across six domains of care [89]. HEDIS has one dental metric- "the percentage of Medicaid members 2-20 years of age with dental benefits, who had at least one dental visit during the year." HEDIS is introducing race and ethnicity stratification in 2022 into select measures; the dental metric is not among them [90].

The DQA was established by the ADA in 2010 to create standardized and validated dental performance metrics and is a leader in developing dental indicators that can be tied to payment. Dental performance measurement has progressed significantly with DQA.

They developed a metric set around preventing and managing dental caries in children. This set includes indicators found in Table 4 [71]. Their metrics are designed as HEDIS-like measures for a large group of individuals who might be covered in a dental plan, and the measures rely on claims data [67], [69]. Their dental sealant metric for children 6- 9 years has been incorporated into the Children's Health Insurance Program, and states began to report on this metric in 2015 [88]. The indicator is measured at the child level, "operationalized as percentages of pediatric cohorts receiving dental sealants." A previous version of the indicator did not account for patients who had restorations, sealants, or non-eruption [51]. However, more recent updates take these into account by excluding children ineligible for sealants using claims data [91]. To identify disparities in care and sharpen the focus of quality improvement efforts, DQA metrics include stratifications for reporting by population sub-groups [61]. Their developed and tested oral health metrics are used by CMS, the US Health Resources and Services Administration, California Health Insurance Marketplace, and at least 18 Medicaid and 6 CHIP programs [92], [93].

**Table 4: Dental Quality Alliance Pediatric Metrics Overview Adapted from ADA Guidelines [91]**

- Percentage of children under age 21 who received a dental service within the reporting year
- Percentage of children under age 21 who received a treatment service within the reporting year
- Percentage of children under age 21 who received a comprehensive or periodic oral evaluation
- Percentage of children under age 21 who have caries risk documented in the reporting year
- Percentage of children aged 1 through 20 years who received at least 2 topical fluoride applications within the reporting year
- Percentage of children who have ever received sealants on a permanent first molar: (1) at least one sealant and (2) all four molars sealed by the 10<sup>th</sup> birthdate
- Percentage of 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 15<sup>th</sup> birth date.
- Number of emergency department visits for caries-related reasons per 100,000 member months for all children
- Percentage of follow-up dental visits within (a) 7 days and (b) 30 days after a caries-related emergency department visit among children 0 through 20 years.
- Total amount reimbursed for clinical services per member per month for all children during the reporting year

The National Quality Forum (NQF), a nonprofit organization, endorses input, process, and outcome metrics. NQF's endorsed metrics must meet rigorous criteria and are used by the federal government, states, and private sector organizations for performance evaluation [94]. The federal government deems NQF-defined indicators or healthcare practices as evidence-based for care improvement [95]. NQF has approved quality metrics developed by both NCQA and DQA [69], [96]. NYS's Quality Assurance Reporting Requirement (QARR) consists of HEDIS and NYS-specific medical and dental indicators. QARR includes only one dental metric—the percentage of 2-20-year-olds who have visited the dentist in the past year. This indicator was obtained from NCQA's HEDIS measurement set. All Medicaid Managed Care plans and Managed Care Organizations certified by NYS DOH are required to report on the applicable QARR metrics for which their members meet the enrollment criteria [92]. NYS's Delivery System Reform Incentive Payment (DSRIP) program, intended to improve health outcomes for Medicaid recipients, adopted metrics from both HEDIS and DQA in its children quality metric set. Figure 1 depicts the relationships of these various indicators' developing, reporting, and enforcing entities.

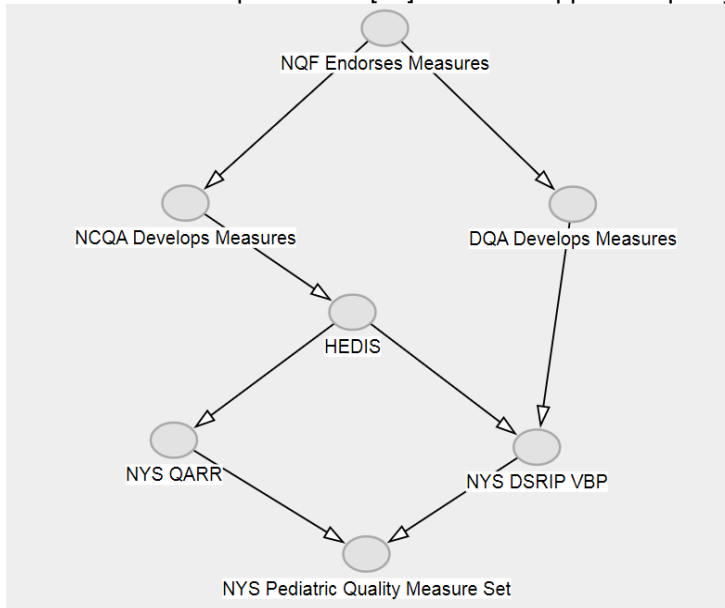


Figure 1 NYS Pediatric Quality Measure Set Development and Endorsement

NYS DOH are required to report on the applicable QARR metrics for which their members meet the enrollment criteria [92]. NYS's Delivery System Reform Incentive Payment (DSRIP) program, intended to improve health outcomes for Medicaid recipients, adopted metrics from both HEDIS and DQA in its children quality metric set. Figure 1 depicts the relationships of these various indicators' developing, reporting, and enforcing entities.

**Recommendation for NYS DOH OHIP:** Given that QARR consists of only one dental metric, NYS DOH should use additional tested, validated metrics such as from the DQA to have a more comprehensive preventive dental metric set. Using existing, tested, and validated metrics decrease redundancy in metric development and strengthens their likelihood of being effective. While the examples found in the narrative review were of different demographics and geographic environments than our target audience, NYS Medicaid population 0-20, the lessons learned and best practices around metric use would be useful for NYS's revision of indicators for their quality assurance of preventive dental care. Any indicators implemented in NYS would need to be evaluated for their effectiveness among the state's demographics.

To strengthen quality assurance of preventive dental care, the NYS VBC measurement set should include metrics on dental service utilization, dental sealants, and topical fluoride.

#### 4.3 Metrics need to be Attainable, Relevant, and Anchored within a Time Frame

Performance indicators should be relevant. They should focus on high-priority areas, provide useful information based on evidence such as prevalence (percentage of individuals affected), its impact on physical health and quality of life, and consider variations and disparities in care [61]. The metrics need to be time-bound and feasible to measure in the proposed time frame. The metrics should be tested across multiple years to evaluate whether the intended goals are met and if any unintended consequences may weaken quality improvement efforts [61].

Keeping metrics minimal in number can help make them attainable, and relevant (because each metric would hold more weight). When they are few in number, they may be more feasible to obtain and therefore can more easily be anchored within a time frame. The ADA recommends adopting a minimum number of quality indicators that are standard, accepted, clear, measurable, and factor in patient compliance and risk [42].

According to Edelstein, it is not feasible for dental practitioners with small practices to adopt "performance responsibility for all but the most modest performance targets" [73]. Any indicators proposed need to be few in number. Table 5 lists examples of metrics that Edelstein feels could hold dentists accountable or provide achievement bonuses.

| Table 5: Metrics proposed by Edelstein, 2018 [73]   |
|---|
| <ul style="list-style-type: none"><li>• The proportion of claims submitted electronically rather than manually</li><li>• The proportion of children who receive preventive services, including topical fluorides and sealants</li><li>• The proportion of children by high, medium, and low risk who receive appropriate intensities of preventive and disease management interventions.</li><li>• The proportion of adults with specified medical conditions (e.g., diabetes) who receive appropriate periodontal care</li><li>• The proportion of treatment plan completions</li><li>• The proportion of patients treated for an emergency condition who subsequently experienced appropriate follow-up care</li><li>• Availability of after-hours emergency services</li><li>• Oral health maintenance evidenced as lack of caries or periodontal disease progression over a specified time period (monitored, for example, through service claims)</li><li>• Patient or parent self-reported oral health status</li><li>• Patient or parent self-reported oral health functionality</li></ul> |

Despite the advancements in electronic medical records, many dentists continue to use paper records. While this may induce differences between dentists, submission of claims for reimbursement, which have standardized dental codes, is a commonality that unifies all dental providers. Claims data can be very useful for the assessment of metrics. Claims data are relevant because they utilize diagnosis codes, attainable from the standardized submission process that has been set in place by the State and insurance providers, and are time-bound. After all, providers can only get reimbursed once they submit them. While diagnostic information on the caries type and appropriateness of treatment are not available in claims data, it is possible to assess the proportion of patients who receive dental sealants and fluoride [42]. The benefits of utilizing claims data for metric assessment will be further discussed in the subsequent sections.

**Recommendation for NYS DOH OHIP:** NYS DOH should utilize claims data for the assessment of performance metrics. The DQA metrics are claims-based and therefore attainable. They have metrics on sealants and fluoride, which are evidence-based, highly recommended services, and therefore relevant. Given that DQA's metrics assess for the reporting year, they are time-bound. To note, any regulatory policy from NYS or a public agency must be anchored in time and therefore would entail hard deadlines for implementation and reporting.

#### 4.4 Metrics need to be Appropriate Proxies

Direct, objective outcome indicators include biological markers, such as tooth loss, infections, and new diseases. Other potential markers include lost work/school days, emergency dental treatment, dentally related emergency department use, or hospitalizations [15]. Outcomes can also take many forms and can operate at various junctures along the causal pathway to health via intermediate steps. Intermediate steps can be appropriate proxies when outcomes are difficult to assess [61]. Therefore, interventions to improve outcomes frequently target access to and/or processes of care, which are among the intermediate steps. Access and process of care indicators are relevant measures of whether consumers receive appropriate care associated with improved health outcomes [91]. Most dental metrics, therefore, address utilization, access, or processes of care [61]. The application of fluoride and sealants are examples of process of care indicators. The clinical use of these treatments has led to improved outcomes [91]. South Carolina, for example, used dental sealants as an outcome measure as a proxy of value in dental care delivery for

children. They selected dental sealants because it a) encompasses established standards of care, b) proven to generate cost savings, and c) measurable at patient and population levels with administrative claims data [51].

**Recommendation for NYS DOH OHIP:** While there may be a need for more high-quality evidence to support associations between oral health care interventions and patient outcomes [61], ample evidence supports the benefits of sealants and fluoride. Therefore, receipt of these treatments should be considered a proxy for strengthened oral health outcomes [42], [91].

#### 4.5 Account for Patient Characteristics when Feasible

It is well-known that clinical and nonclinical patient characteristics may influence outcome measures. If VBP reprimands clinicians who serve more vulnerable populations with increased risk for disease and greater barriers to securing recommended care, it may be self-defeating. Risk adjusting measures take into account patient characteristics and attempt to minimize unintended consequences. While metric development and use should account for patient characteristics [61], it was not feasible during the ADA Dental Quality Alliance's (DQA) administration of performance metrics.

Evidence-based dental guidelines recommend risk assessment of each patient for treatment planning and care delivery [91]. Ideally, preventive dental services would be administered to children with elevated caries risk. During their evaluation of performance indicators, ADA's Dental Quality Alliance (DQA) and their stakeholders reported significant biases in the validity of identifying children at elevated risk. For example, many children at elevated risk may not be accessing the dental care system and thus not captured in the denominator. Subsequently, they eliminated the elevated risk criterion as a mandatory prerequisite for primary preventive services such as sealants and fluoride<sup>7</sup>. As a group, Medicaid children are at elevated risk for pit and fissure caries, which represents the prime area of restorative care [47]. While further risk adjustment within the Medicaid population may strengthen cost-effectiveness for care provision, VBC would be better achieved if more rather than fewer children are targeted for these evidence-based treatments.

**Recommendation for NYS DOH OHIP:** All children under Medicaid should receive topical fluoride and sealants, given they are primary preventive treatments. Primary prevention should be the overriding

objective of NYS DOH's sealant and fluoride metrics. Their sealant and fluoride metrics should reflect this by making stratification by elevated caries risk an optional criterion.

#### 4.6 Strive for Standardized Data Collection and Harmonization

Data fields, terminology, and definitions need to be standardized across platforms. With standardized terminology and requiring data completion in structured forms and templates, uniformity of data collected could be achieved, strengthening the quality of the results [97].

The standardization in data platforms would decrease measurement bias and would strengthen the validity of the actionable insights extrapolated from the platform. [7]. When data collected is accessible to both analysts and clinicians, it can further support quality improvement efforts. For example, the data analysis can identify any associations between care interventions and outcomes, allow for outcomes comparisons and help improve the information technology infrastructure to support performance measurement [61]. DQA metrics are standardized, have detailed specifications, and are validated for usability, feasibility, reliability, and validity.

**Recommendation for NYS DOH OHI:** NYS DOH would need to ensure standardization of performance indicator specification and its harmonization across all Medicaid purchasers. Both are key to decreasing the measurement burden by obviating unnecessary data variations and duplicative reporting. The coordinated efforts across public purchasers would maximize consistency, assist with precision and validity in metric reporting and assessment, as well as strengthen provider trust and morale [61]. By leveraging DQA metrics, NYS DOH can benefit from direct comparisons with other jurisdictions that also utilize them.

#### 4.7 Build Appropriate Information Technology Infrastructure

Integrated and accessible health information systems are essential for the transition to VBC and associated performance measurement. The current IT infrastructure commonly functions in a silo with limited data aggregation capabilities beyond the practice level. Siloed IT systems may make the measurement of cost and outcomes virtually impossible, impeding value improvement efforts [61].

Data silos keep health systems, payers, and providers from gaining unified views of dental practices and clinical outcomes [7]. Compilation of health data is meaningful if done systematically with inter-linkable



data and data harmonization [97]. Currently, the majority of databases are incompatible with each other [97].

Besides the benefits for VBC, electronic medical records (EMRs) help exchange rapid, reliable information for task management, care coordination, patient triage, monitoring, and surveillance [10]. EMRs can face the same systematic errors, caused by incomplete or incorrect data as other data collection mechanisms [97]. The output is only as good as the reliability and validity of the inputted information [97].

**Recommendation for NYS DOH OHIP:** Presently, EMRs may be limited to practice-level and make it challenging to obtain comprehensive documentation of care longitudinally within provider and cross-sectionally across providers for comparison and summary results from indicators. However, practice management billing systems feed into administrative claims databases [61]. While and until NYS DOH awaits a compatible dental EMR across all dental providers, they should utilize claims data for the performance measurement of preventive dental services.

#### [4.8 Reimburse Dental Providers through Alternative Payment Models \(APM\)](#)

As a profession, dentistry may value prevention but has not been reimbursed accordingly. An evaluation of reimbursement reported net revenue of \$91.40 per hour for adult prophylaxis (dental cleaning) after covering the clinician's salary [47]. In contrast, a three-surface amalgam, three-surface composite, and crown restorations yielded \$143.80, \$219.80, and \$374.80 net revenue per hour [47]. Therefore, significantly greater financial incentives are observed for more invasive surgical procedures. In a different study, less than 40% of the office revenue comprised of diagnostic and preventive services, even though 70% of procedures delivered fell into these two categories [98]. The misbalance of allocation will only be distorted if there is a strengthened increase in preventive care without unparalleled revenue. There are set dollars available in any system, and health care economics is about allocating those dollars [15]. Caries management reform through VBC would require an amendment to economic allocation [15].

Dental plans could increase reimbursement fees and coverage for preventive services. The increased allocation towards preventive care will generate a downstream effect, motivating Dental Health Maintenance Organizations (DHMOs) and dental practitioners to obtain patient buy-in for preventive services. The strengthened cost-effectiveness through the reallocation of funds to preventive services

would better population health, decrease per capita costs [47], and result in cost savings. Boston Children's Hospital (BCH) tested a model with increased payment for preventative dental care. In the first 12 months, BCH reduced the cost of treating its population of early childhood caries children (n=403) by approximately \$300,000 [47]. Innovative financing models such as shared savings (dental practitioners receive a portion of the \$300,000) could further incentivize the increase of preventive dental care.

**Recommendation for NYS DOH OHIP:** Amend economic allocation, strengthen incentives for preventive services, and strive for cost-effectiveness.

There is a continued struggle in both the medical and dental professions on incentivizing clinicians to pursue minimally invasive preventive care [60]. Such value-oriented reimbursement is more common in the medical field than in dentistry. According to the 2014 National Scorecard on Payment Reform, 40 percent of all [medical, dental, vision] commercial in-network payments, 24 percent of primary care outpatient payments, and 10 percent of outpatient specialist payments were tied to performance or waste reduction [2]. In a survey conducted by Aon Hewitt LLC of nearly 800 large and midsized US employers with over seven million employees, 53 percent of the employers reported that provider payment models which promote cost-effective, high-quality healthcare outcomes would be the future health care strategy [69]. Twenty percent identified it as one of their three highest priorities [69]. One-third had increased interest in P4P models- they would increase/decrease health care provider compensation conditional on performance targets [69]. FFS, capitation, and salary are the common provider reimbursement approaches, especially in dentistry. Generally, these do not tie reimbursement to health outcomes [71], in part because metrics may be nonexistent or too weak to tie to compensation. The development of a comprehensive metric system can yield a successful P4P program.

The CMS encourages a capitation per-member/per month (PMPM) payment model based on patient complexity. This payment model would be for practices willing to strengthen access and continuity, comprehensiveness, care management, coordination, patient engagement, and planned care and population health [10]. Kaiser Permanente (KP) and the Southcentral Foundation (SCF) of Alaska are considered high functional models of primary care in the US [10]. They reimburse through capitation- either a global capitation or sub-capitation for primary care providers with or without risk-sharing. [10]. While FFS

often results in over-utilization of services, capitation produces under-treatment. Clinicians are less motivated to evaluate and treat patients if they get paid for them anyway. Reimbursement linked to quality outcomes (P4P) can help meet VBC goals.

The value agenda is driving essential innovations in how providers are reimbursed. There are numerous types of proposed reimbursement models. Permanente Dental Associates of KP Northwest tie dental reimbursements to patient satisfaction, accessibility of care, providing evidence-based care, and interprofessional collaboration with primary medical care [88]. Their reimbursement is therefore tied to meeting specific objectives. The Health Care Payment Learning and Action Network (LAN) APM has used a framework comprised of four types of payments 1) FFS with no link to quality and value 2) FFS linked to quality and value 3) alternative payment built on FFS architecture 4) population or global payment structure [99]. HCP LAN's developed framework transitions from the traditional FFS approach to outcomes-oriented, population-based payments. A modified FFS is implemented when reimbursement is partially tied to quality metrics (i.e., P4P). A proportion of reimbursement is conditional on meeting performance targets for existing quality indicators, such as the percentage of patients receiving the recommended preventive care [61]. Alternatively, four payment models were also identified by The Robert Wood Johnson Foundation (RWJF) 1) population-based payment- capitation payment with shared savings/incurred costs based on quality standards [100] 2) patient-centered medical home payment (PCMH)-a fixed payment per patient per month for enhanced outreach, communication, and coordination [101] 3) high-intensity primary care payment-set reimbursement given to interdisciplinary medical teams for care and outreach to patients with chronic illnesses, [102] and 4) bundled payment (also known as episode-based payment and global payment)-set reimbursement for all services required by a patient for a single condition or treatment [103]. The common thread across RWJF models is having fixed payments that have quality indicators as factors in reimbursement and are not tied to the volume of services [47].

**Recommendation for NYS DOH OHIP:** Link reimbursements to quality metrics

The National Network for Oral Health Access (NNOHA) improved sealant rates for its community health center dental programs through a same-day sealants program during preventive dental visits. NNOHA encourages its clinics to rely on metrics and make data-driven improvements. NNOHA enables their clinics

to schedule longer appointment times for risk-based sealants [51]. They suggest these principles be adapted to frame VBP models for Medicaid programs, even in states that institute FFS models [51]. A payment incentive could be provided for same-day applications, or sealant payments could be bundled with oral examinations and risk assessments.

**Recommendation for NYS DOH OHIP:** Amend economic allocation, strengthen incentives for preventive services, and strive for cost-effectiveness. Institute payment reforms and alternative payment models (ABM) tied to performance metrics [71]. P4P should be based on measured improvements in outcomes and should be an added component to compensation in dentistry today [69], [71]. Push for “same-day” fluoride and sealants with bundled payments. The metrics proposed in this paper for providers who serve Medicaid recipients 0-21 years of age should be tied to payment. Begin P4P payment reform upon the development of a comprehensive preventive dental metric set. The quality metrics should complement payment changes that reward value. Furthermore, the VBP should reward care delivery to high-risk populations, especially the outcomes earned from effective caries prevention and management [15]. The burden of dental disease, management needs, and challenges in care vary by age and income, and further disparities exist within subsets. The reimbursement system would need to reflect the differences in the earned value. Last but not least, the amended payment system must be understandable and transparent to each stakeholder, including but not limited to consumers, employers, the public sector, third-party payers, and all of the agents and administrators that partake in instituting the current payment systems [15].

#### 4.9 Strengthen Provider Accountability by Improving QARR's Use of Dental Metrics

Value metrics are central to all VBP, and VBC approaches. The indicators are instituted to facilitate payment, evaluate initiatives' results, and drive improvement [61]. Metrics have been argued to be a 'necessary cause' for cost reduction in health care [68]. Value should be tied to accountability by using metrics that reflect the quality of care provided. Accountability is strengthened when payors such as Medicaid impose benchmarks on enforced metrics, driving the improvements that benchmarking inherently reveals.

Metrics allow the establishment of benchmarks for care that are indicative of improved dental health. Benchmarks can be set when standardized metrics are implemented across reporting entities, allowing for

apples-to-apples comparison and improvement opportunities [104], [105]. These metrics take on meaning as they are applied to purchaser groups who want to know how their members compare to the benchmarks and to identify their return on investment in dental care. It also takes on meaning for payors who want to evaluate how their dental providers compare to the benchmarks. If plans need to show improvement, they can only achieve that goal by strengthening their care delivery [69]. This strengthens the accountability of benefit plans or dental insurers and motivates collaboration in new and different ways with network dental and medical providers to drive the improvements that benchmarking inherently reveals.

**Recommendation for NYS DOH OHIP:** NYS DOH should amend QARR to move NYS’s needle towards dental VBC. QARR should be amended to encompass a comprehensive dental metric set to improve the utilization of preventive dental services among Medicaid recipients. As mentioned, all Medicaid Managed

Care plans and Managed Care Organizations certified by NYS DOH are required to report on the applicable QARR metrics for which their members meet the enrollment criteria [92]. Therefore, NYS’s dental providers are well acquainted with QARR. NYS sets benchmarks on its QARR metrics. While NYS HMOs strive to meet the ‘medical’ benchmarks, the dental metric (the percentage of 2-20-year-olds who have visited the dentist in the past year) is outsourced to NYS DHMOs. DHMOs are contracted with HMOs to provide dental services to the HMO’s members and

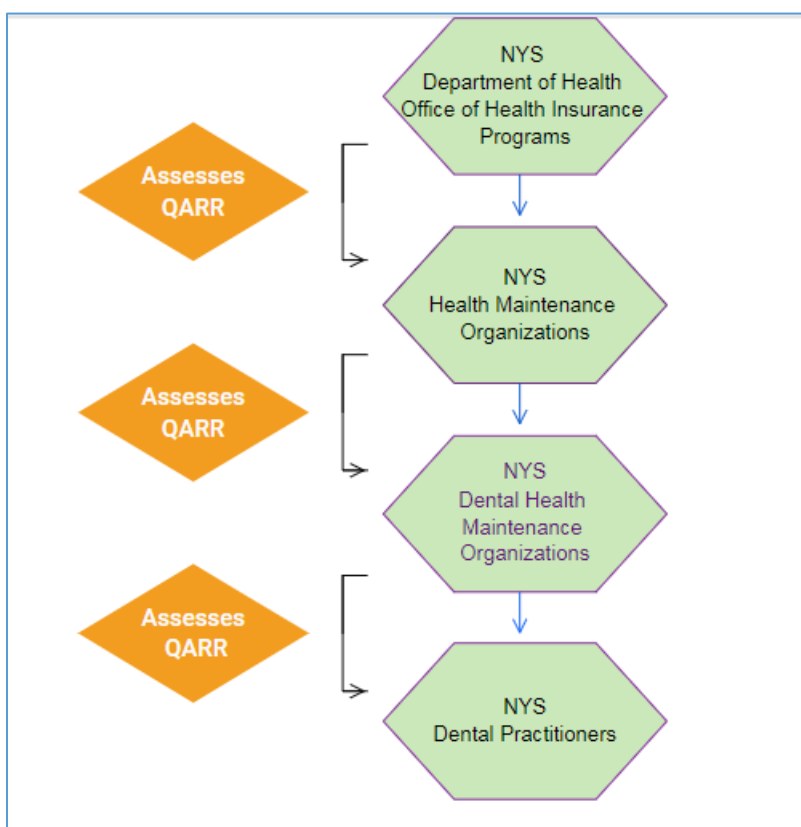


Figure 2 Hierarchy of QARR assessment. Strengthening dental assessment of preventive care through QARR will have a downstream effect, motivating HMOs, DHMOs, and dental practitioners to increase patient utilization of preventive dental services.

meet the dental QARR benchmark for the HMO. The DHMOs, with their dental and medical practitioners,

attempt to meet the benchmark for this metric. Feeling pressured by the indicator, the DHMOs and dental practitioners administer oral health initiatives annually to strengthen dental service utilization and their subsequent dental QARR scores. NYS's dental providers feel motivated to meet its benchmarks given its rewards and penalties and because their reputation is at stake, as QARR scores can mean a difference in sustaining/gaining a contract with the HMOs. A large HMO recently did not renew a contract with a leading DHMO because it did not have impressive QARR scores. Therefore, QARR can make a difference in scale and revenue. Strengthening dental assessment of preventive care through QARR will have a downstream effect, motivating HMOs, DHMOs, and dental practitioners to increase patient utilization of preventive dental services (Figure 2). Hence, creating a benchmark with a reward and penalty should substantially impact the payor and provider performance.

#### 4.10 Amend QARR to Strengthen Quality Assurance of Preventive Dental Services

NYS's QARR does not measure key oral health indicators for the quality of dental services. QARR consists of only one dental metric—the percentage of 2-20-year-olds who have visited the dentist in the past year. This indicator was obtained from NCQA's HEDIS measurement set. The metric aims to quantify preventive oral health care, and it can be met with the D0190 screening encounter billing code.

- This indicator does not ensure that providers offer comprehensive dental care. The D0190 screening code determines an individual's need to be seen by a dentist for a diagnosis [106]. NCQA chooses to use this code to satisfy the performance indicator instead of more comprehensive (D0150) or periodic (D0120) oral examination codes. While a dentist must do the examinations under D0150 and D0120, a dental hygienist can conduct the screening under D0190 [107].
- This indicator does not require case completion. Dental plans can screen children without providing treatment or follow-up and still meet the QARR benchmark. Dental providers frequently perform these limited dental screenings in schools and community events. This type of visit offers minimal benefit to the recipient and does not ensure continuity of care.
- This indicator does not reflect the ADA-recommended age of one year at which preventive dental visits should begin. Therefore, dental providers may expend their resources on children two and above, an unintended consequence for children younger than two years of age. Tooth

decay can begin with the first tooth, and early intervention is necessary to decrease the incidence of caries.

- This indicator does not require preventive or restorative treatment. Therefore, it does not track the application of dental sealants or fluoride.
- The benchmarks for this indicator change only a nominal amount year to year. Dental providers are only motivated to meet the benchmark but not to exceed it. Table 6 lists the 2019 and 2020 benchmarks for the annual dental visit metric. Plans are awarded 50% of possible points if its benchmark is met and when  $(x = \text{benchmark})$   $50^{\text{th}} \text{ percentile} \leq x < 75^{\text{th}} \text{ percentile}$ , 75% of possible points if its benchmark is met, and when  $75^{\text{th}} \text{ percentile} \leq x < 90^{\text{th}} \text{ percentile}$ , and 100% of possible points when  $x \geq 90^{\text{th}} \text{ percentile}$  [108].

| Table 6: 2019 and 2020 Annual Dental Visit QARR Benchmarks [108], [109]. |      |                             |                             |                             |
|--|------|-----------------------------|-----------------------------|-----------------------------|
| Measure  | Year | 90 <sup>th</sup> Percentile | 75 <sup>th</sup> Percentile | 50 <sup>th</sup> Percentile |
| Annual Dental Visit  | 2020 | 70.13                       | 66.55                       | 62.79                       |
|  | 2019 | 69.24                       | 67.43                       | 61.45                       |

NYS DSRIP VBP adopted the HEDIS dental service utilization metric and the ADA DQA metric on fluoride varnish. In addition to the shortfalls listed above, the NYS DSRIP’s dental metrics have the following limitations-

- Both dental metrics, on utilization and fluoride varnish, are pay for reporting and not for performance. Therefore, quality could be compromised.
- The fluoride varnish metric uses a retired version of the indicator, which targets children documented for being at elevated risk for caries. Targeting children documented at elevated risk bypass those who did not utilize dental services and lacked an evaluation, had caries that did not progress to meet the cutoff, or lacked the codes but had caries<sup>7</sup>.
- The dental metric set does not track the application of sealants.

The NYS DSRIP has been eliminated due to lack of funding; its VBP indicators' continued enforcement is uncertain [110]. In August 2021, NYS DOH OHIP submitted an 1115 waiver to the federal government for 17 billion grant funds across five years [111]. The proposal includes several lessons

learned from its experience with DSRIP<sup>6</sup> and plans for a payment reform for NYS Medicaid [111]. The recommendations made in the next section can be included in the 1115 goals for dental. The five-year funding deadline would expedite the implementation and the evaluation of the metric's effectiveness. The lessons learned from which could be cross-pollinated across QARR.

That said, a key lesson from the NYS DSRIP program (and many other grant programs) is that there is a high risk of diminishing initiatives once funding depletes. Similarly, there is uncertainty on whether NYS would continue to receive funding through 1115 or other payment streams in the long term and whether 1115's programs would sustain. Hence, it would be most efficient and sustainable to amend NYS QARR, given the instability of funding for grant programs. QARR should be amended to encompass a comprehensive dental metric set to improve the utilization of preventive dental services among Medicaid recipients (Figure 2).

#### Section 5: Recommended Revisions to NYS's Assessment of Preventive Dental Services through QARR

NYS DOH OHIP should revise its QARR dental quality metric obtained from NCQA's HEDIS and further develop a preventive dental metric set to shift towards dental VBC. They can consider leveraging DQA's expertise in dental metric development to inform the additional preventive metrics for NYS (Figure 3). DQA is a leader in developing dental metrics that can be tied to payment. Their developed and tested oral health indicators are adopted by CMS, the US Health Resources and Services Administration, California Health Insurance Marketplace, and several Medicaid programs across the US [89], [92]. To strengthen the assessment of preventive dental services through QARR, NYS should consider the following revisions-

1. Revise QARR's oral health indicator to measure the percentage of all enrolled children under age 21 who received dental services within the reporting year. This should strengthen the utilization of services among children 0-2 years of age, who are excluded from the current metric (which evaluates children 2-20). Domain= access to care.

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<sup>6</sup> Key lessons learned from DSRIP include, need for regional alignment on objectives, strengthen involvement of Community Based Organizations and behavioral health providers in governance and accountability for VBP, deeper alignment of payer and provider incentives.



- DQA uses the age <21 years. DQA indicators are aligned across public and private sectors. For consistency with Medicaid Early and Periodic Screening, Diagnostic and Treatment eligibility, they defined children as individuals <21 years.
2. Replace QARR's dental screening encounter code (D0190) with comprehensive (D0150) or periodic (D0120) oral examination codes. Domain= process to care
    - DQA has developed, tested, and implemented the use of these codes across 40 states, based on children receiving a comprehensive (D0150) or periodic (D0120) oral evaluation during a reporting period.
    - Dental service would be defined as comprehensive or periodic Oral examination (OEV-CH-A), treatment services (TRT-CH-A), preventive Services (PRV-CH-A)
  3. Create a metric for the application of sealants in the erupted, unrestored adult molar teeth of children. Domain= process of care
    - According to the Centers for Medicare and Medicaid Services, 25 states have implemented the DQA sealant metric as part of their quality assurance [112].
    - DQA's 2022 indicator requires dental plans to calculate the number of children receiving sealants by their 10th birthday for permanent first molars and by the 15th birthday for permanent second molars. Results would be reported based on claims data. The denominator excludes children with no sealable permanent molars. In the most recent iteration of the metric, DQA removed elevated caries risk as a criterion from the denominator<sup>7</sup>.
    - Sealant receipt in permanent 1st molars would be defined as (SFM-CH-A) and sealant receipt on permanent 2nd molars would be defined as (SSM-CH-A).

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<sup>7</sup> Formerly, the denominator-eligible population was limited to children at elevated risk based on caries-related treatment codes (CDT codes) and caries risk assessment (CRA). The reporting and documentation of these codes in claims data is limited. Children lacking the codes but who were actually at elevated risk were not included in the preventive metrics' denominators. Children who were not accessing the dental care system were also not captured, which itself is a risk factor. Children with caries-related lesions that have not progressed to the point of an intervention/treatment (which is a pre-requisite for being at categorized at "elevated risk") were also not being captured. In parallel, DQA deemed primary prevention as an overriding objective of these measures and decided to remove the "elevated risk" as a mandatory criteria. After testing and validating the metrics' denominators without the elevated risk criteria, they now recommend optional stratification by elevated caries risk [91] .

4. Create a metric for the application of topical fluoride at least once every six months on all teeth of children and adolescents under the age of 21. Domain=process of care

- Allow for the indicator to be met through medical and dental channels.
- Topical Fluoride would be defined as (TFL-CH-A).

5. Utilize existing tested and validated preventive dental metrics.

- NYS Medicaid can consider leveraging DQA's metrics which are more comprehensive than NCQA's, as well as tested and validated (Figure 3). Just like NCQA's metrics, DQA's indicators are endorsed by NQF.

6. Raise statewide QARR benchmark metrics annually to encourage higher utilization and success of services.

- The system of rewards and penalties should continue to incentivize HMOs and DHMOs to meet state benchmarks.

7. Tie performance metrics' achievement to reimbursement (P4P).

- Resort to pay for performance as opposed to pay for reporting.
- NYS is acquainted with pairing reimbursement to QARR. Currently, rewards or penalties are given if and when QARR metrics are met to strengthen provider adherence. The use of financial incentives has proven successful in engaging Medicaid Managed Care Plans in developing infrastructure, programs, and resources to promote high-quality care.

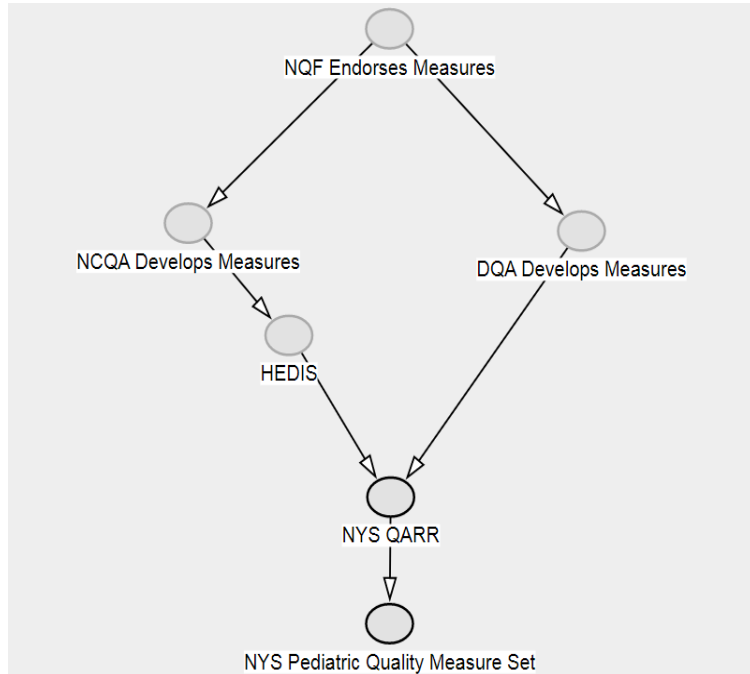


Figure 3 NYS DOH OHIP should revise the existing dental indicator from NCQA HEDIS and adopt DQA metrics to strengthen its assessment of preventive dental services through QARR

Incorporating financial incentives that tie payment directly to quality is an important approach to improving the quality of care, holds health plans accountable for the care they provide, and rewards those who invest in processes that improve care.

8. Evaluate implemented metrics for their effectiveness in reducing the need for restorative services to help achieve VBC goals among NYS Medicaid recipients 0-20 years of age.
9. Release an open comment period to seek stakeholders' perception
  - Remind all partners, dental-based organizations, and patient advocates to comment on the established metrics.
  - Establish a bipartisan interdisciplinary team to review and amend, as necessary.

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