CareQuest Institute for Oral Health™

WHITE PAPER

System Transformation:

A Three Domain Framework to Innovating Oral Health Care

SUGGESTED CITATION:
CareQuest Institute for Oral Health. System Transformation: A Three Domain Framework to Innovating Oral Health Care. Boston, MA; October 2020. DOI: 10.35565/CQI.2020.2015

WHITE PAPER

System Transformation:

A Three Domain Framework to Innovating Oral Health Care

For decades, dentistry's predominant approach to care has been invasive procedures that are reimbursed by dental insurance payors as fee-for-service. Many industry leaders recognize this approach lacks concordance with changing care delivery and reimbursement which is person-centered, value-based, and prevention-oriented. As a result, oral health care advances have lagged compared to other measures of health status. A more distinct and recharged dental care model is needed for these times. We propose an expanded model for primary and secondary prevention using emerging technology and transformative methodology. This promising new oral health[a] model will be cost-effective, efficient, and more equitable. The Three Domain Framework builds on health promotion and disease prevention while supporting value-based care. Through an analysis of projected Medicaid costs, this paper describes a new "Three Domain Model for Dentistry" with a roadmap for implementation.

Background

Dentistry has long been a profession ripe for disruption. Dental care delivery has disproportionately focused on invasive intervention and a fee-for-service payment model that leaves many people lacking access to quality care. The COVID-19 pandemic has catalyzed an overdue and necessary structural change within dental care delivery. As shelter-in-place orders from state governments closed or significantly limited the operation of dental offices, dental care teams invested in virtual care in response to urgent needs. Dental offices adapted to numerous challenges in reopening their doors. Subsequently, providers have implemented new infection control procedures including aerosol management[b] protocols as well as social distancing to reestablish trust in the safety of care.

Most private dental practices essentially operate as small businesses. Recent commentaries suggest that small businesses should now consider aligning financial strategies with start-up models: flexibility with consumer needs, rapid adaptation to the marketplace, creative problem-solving, diversifying funding streams, consolidating partnerships, and innovative delivery of services.[1-4] Prior to COVID-19, alternative dental payment models were starting to receive acceptance as increased convergence between medicine and dentistry coupled with health care payment reform changed consumer and provider desires. Additionally, increased awareness of socioeconomic and racial inequities continue to challenge the norms of traditional dental care delivery.[5-25] Ultimately, the COVID-19 pandemic has exposed how incompatible the last-century dental operating model is with the evolving political, economic, and public health environment in the 21st century. In its wake, nations face an imperative to reconfigure the organization, financing, and delivery of oral health care.

[a] Oral health is a fundamental component of health and physical and mental well-being. Oral health is multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex (FDI World Dental Federation).

[b] A dental aerosol is an aerosol that is produced from dental instruments, dental handpieces, three-way syringes and other high-speed instruments. These aerosols are a suspension of fine solid particles or liquid droplets in air or another gas.

Purpose and Significance

Operationalizing Three Domains to Enhance Oral Health

The Three Domains Framework creates a structure that incorporates primary and secondary care for oral health care delivery. This structure facilitates value-based payment models and enables patients to invest in their oral health. The Three Domain framework forms an interdependent care environment that prioritizes prevention but provides oral health providers and the patient an ability to determine the treatment that best meets the patient's needs. Care teams can tailor the domain approach to the specific needs of the patient while leveraging opportunities for whole-person health. By prioritizing primary care and prevention through Domains One and Two, whole-person health is deeply integrated into the care delivery process.

Tele-Prevention

Domain One builds an accessible, convenient, evidence-based virtual care approach to accompany in-person oral health care delivery using technology for enhanced disease prevention and whole-person health.

Minimally Invasive Care

Domain Two focuses on minimally invasive care that reverses or slows early disease stages using a program of anticipatory guidance and collaborative decision-making with patients.

Integrated and Personalized Care

Domain Three introduces personalized oral health care that prolongs the life of hard and soft tissues by reducing tooth/tissue mortality through risk stratification and medical-dental integration using predictive analytics and safe, individualized surgical intervention.

The domains approach introduces an elevated model of dental care that emphasizes patient and provider safety while addressing crucial gaps in both financial viability and inequitable access to care. The Three Domain Model for Dentistry achieves the following:

1. Encompasses three nonlinear domains of oral health investment that facilitate financial viability and improved population health.
2. Emphasizes the need for safe, sustainable, and diverse business models that prioritize patient health and wellness.
3. Facilitates the capacity of hybrid[c] teledentistry models to effectively coordinate care for underserved, poorly served and never served communities.
4. Centers personalized care based on individual disease process rather than a one-size-fits-all "repair and replace" model.
5. Encourages systemic interprofessional changes in oral health care delivery to mitigate health inequities.
6. Evolves and expands patient choice through care innovations and technology enhancement.

[c] A way of working, organizing, or doing something that is composed of elements of two separate systems. In this case, in-person prevention visits joined with teledentistry visits to improve overall oral and general health.

The proposed framework is nested[d] and nonlinear, meaning oral health care teams can choose any one of the three domains as a place to begin based on needs and capability. This flexibility enables providers to explore a new model of dentistry by starting with a domain that supports the comfort and experience of the care team. These domains of care support the spectrum of clinical care delivery, but call for increased investment in the elements of Domains One and Two given the current reimbursement and design structures in dentistry. Care teams and stakeholders should tailor the domain approach to the specific needs of the patient consistent with the quadruple aim.[e] The following evidence-based resources informed the domain framework:

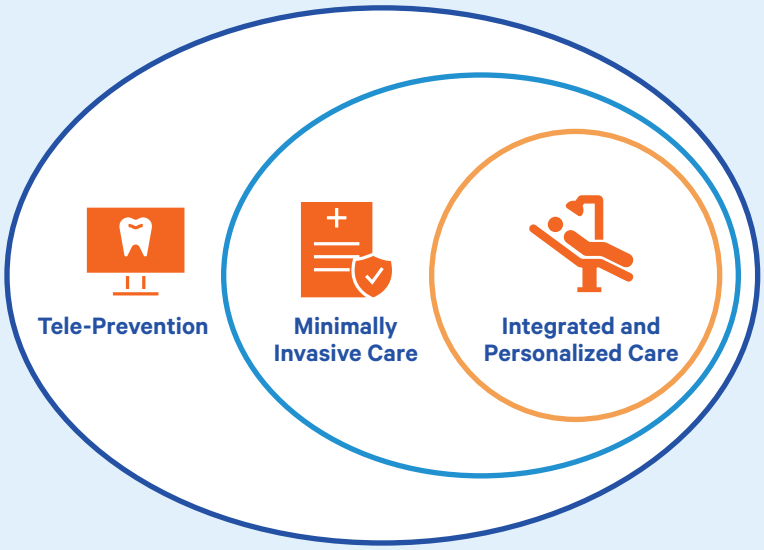


Figure 1. The Three Domain Framework

- **Predictive models:** Professional organizations and actuarial firms show a decline in utilization of traditional dental care as well as an increase in personalized care delivery;[26-30]
- **State budgets:** A COVID-19 pandemic-related decrease or stagnation in state Medicaid budgets coupled with increases in Medicaid enrollment;[31-32]
- **Health care spending:** Higher utilization and lower overall health care spending from value-based dental care models that reduce medical costs by keeping patients out of the emergency department and augmenting chronic disease management;[15,33-35]
- **Health care delivery:** Financial and care delivery changes that have been accelerated by the pandemic;[36-39] and
- **Workforce:** Dental teams should be centered on the proficient and efficient delivery of preventive care. Interprofessional care teams should value whole-person health to reduce negative health outcomes through needs-based service planning.[f, 40-41]

Central to the Three Domain Framework is an understanding of economic, social, and political factors associated with oral health care delivery. These factors influence utilization, shift the regulatory environment, change consumer habits, increase cost and liability, and affect the development of technology (e.g., artificial intelligence, HIPAA compliance, and interoperability of electronic health records). The changing financial environment in state and federal insurance because of the economic downturn that resulted from the COVID-19 pandemic and the loss of coverage in Medicaid/Medicare/Dual programs will force innovation in oral health care delivery that increases access while controlling costs. Existing accountable care organizations (ACOs), managed care groups, and dental service or care organizations have successfully used value-based care models to sustain population health while reducing the cost of quality care and engaging patients to be actively involved in their health.[4, 15, 18, 42-49] Therefore, we reviewed existing value-based oral health care (VBOHC) models to inform the design of the domains. This methodology can allow dental practices to be more competitive in a multi-payer environment based on best practices from current alternative payment models (APMs)[g] and VBOHC operations.

[d] Referring to a paradigmatic framework in which components are all interlinked, but at times it is useful to focus on these aspects in relation to each other.

[e] The vernacular used when the satisfaction and business model support of clinical care teams is considered in addition to the other goals of the Institute for Healthcare Improvement's (IHI) Triple Aim: better health outcomes, reducing per capita cost of health care, and increased satisfaction with the care experience.

[f] Needs-based service planning include the utilization of health workforce planning with human resource strategies and alignment of health services to account for a population's needs for health and health care.

[g] APMs involve a range of reimbursement or payment structures that utilize either a fee-for-service or capitation payments with incentives to achieve measurable health goals.

Social Determinants of Health and Healthy Communities

Considering the social determinants of health (SDOH)[h] is crucial to creating thriving, healthy communities. These factors affect the success in implementing the Three Domains framework. Examples of oral health SDOH include socio-economic indicators such as access to affordable healthy food and reliable transportation, language proficiency, immunization status, literacy, previous dental care, educational attainment, citizenship status, and stable housing.[51] Addressing the social risk factors adjacent to the SDOH are important when identifying barriers to optimal oral health.[i] Over the lifespan, SDOH influence as much as 60–80% of health outcomes, and contribute to significant disparities across populations.[51-53] As the dental health care system increasingly uses data to improve processes, outcomes, quality, and value within clinical settings, providers should understand the significant role nonclinical factors have in influencing patient outcomes.

As care teams seek to capitalize on their role within a value-based model of care, they should focus on the social drivers of health outcomes.

Oral health providers can maximize the care experience by recognizing the social, financial, linguistic, or time barriers experienced by patients. As care teams seek to capitalize on their role within a value-based model of care, they should focus on the social drivers of health outcomes. Without considering the upstream[j] factors that impact patients, quality improvement efforts may not fully achieve intended outcomes. Teledentistry can help address SDOH by reducing barriers to health related to transportation, time needed to have an oral health service, availability of oral health services in the local community, and integration of oral health services with general and social service systems. Teledentistry standards of practice should include the coordination of care between dental providers, other health care providers, community health workers, case managers, and language interpreters.[54-55] To this end, care teams, oral health networks, and health care payors should create SDOH referral networks and health information exchanges that prioritize whole-person health needs, including oral health, in the health care delivery system. When critical social services and environmental supports are inaccessible, there may be opportunities to explore innovative partnerships for necessary structural changes that advance whole-person and communal health. This stakeholder interaction not only could increase patient access to oral health education, prevention, and other oral care services, but also could result in improved whole health outcomes by expanding upon the medical and dental home concepts through enhanced collaborative and coordinated care efforts. Oral health professionals and stakeholders should advocate for a system that prioritizes and supports providers who care for patients with the heaviest disease burden.

[h] The Centers for Disease Control and Prevention (CDC) defines social determinants of health as conditions in the places where people live, learn, work, and play that affect health risks and outcomes.

[i] Social risk factors are defined as "the adverse social conditions associated with poor health, such as food insecurity and housing instability."

[j] According to the Rand Corporation, upstream factors refer to the macro factors that comprise social-structural influences on health and health systems, government policies, and the social, physical, economic, and environmental factors that determine health.

Domain One: Tele-Prevention

Domain One Clinical Guidance

Domain One's primary focus is to build an accessible, convenient, evidence-based virtual framework for oral health care centered on disease prevention and whole-person health. The proposed interdependent domains of care delivery rely on increased adoption of teledentistry to accelerate prevention and disease management, but cannot completely replace in-person encounters. Teledentistry bolsters current prevention and healthy behavior strategies used to improve the health of individuals. As a component of telehealth, teledentistry can support integrated, wholistic care in conjunction with other health professionals (e.g., medical providers, mental health providers, etc.).[60] Eventual best practices will use telehealth capabilities to enhance risk-based prevention during in-person oral health and dental care delivery.

Teledentistry bolsters current prevention and healthy behavior strategies used to improve the health of individuals.

Before the COVID-19 pandemic, safety net providers were the primary users of telehealth, and most dental providers did not incorporate teledentistry into their practices. Teledentistry has historically struggled with adoption because of reimbursement policies, state and supervision regulations, lack of accessible technology, real and perceived lack of use cases, and an elusive business model. As COVID-19 drove care teams to reduce direct patient contact, use of teledentistry initially increased to maintain provider-patient connection (although it has subsequently diminished significantly as dental offices reopened). Consequently, several states either created or expanded temporary or permanent teledentistry regulations. The movement toward adoption of teledentistry in the wake of COVID-19 presents opportunities to reengineer the traditional care pathway toward oral health promotion and disease prevention.[56-59] The novel modality and variation in regulation (currently only 20 states have specific teledentistry policies) necessitates additional guidance related to teledentistry.[61]

This section will consider three components[k] of telehealth in dentistry: 1) synchronous[l] urgent visit, 2) synchronous prevention visit, and 3) asynchronous[m] prevention visit.

Component One: Synchronous Urgent Visits

Synchronous urgent care visits use telehealth-enabled communication for providers to remotely assess and triage patients with dental emergencies. Urgent or emergent visits can be leveraged as a gateway for patients to establish a dental home and a pathway for prevention opportunities. Providers can determine the appropriate care location, interventions, and treatment plan without needing physical contact. Recent data from the American Dental Association's Health Policy Institute indicated that approximately 40% of patients with urgent telehealth needs did not require an in-person emergency treatment.[28] Similarly, the DentaQuest Partnership in December 2020 determined that 65% of procedures performed during initial in-office emergency visits involved only diagnostics, and less than one-third needed restorations or tooth removal.[n, 63] Synchronous consultations can allow providers to prescribe medications and appropriate treatment, which may avert more costly and disruptive visits to hospital emergency departments. Convenient access to a dental provider, coupled with avoiding unnecessary in-person visits (both to a dental office or hospital emergency department), make virtual encounters for urgent care a prime target for expansion. The CDT Code Packages[o] related to a synchronous urgent visit are displayed in Table 1.

Component Two: Synchronous Prevention Visits

Synchronous prevention visits focus on evaluating health status for disease prevention using a teleprevention model (Table 2). Virtual visits can be a beneficial tool for the provider and community, especially when community health workers are

Table 1. *CDT Code Packages for Synchronous Urgent Visits*

Synchronous Urgent Visits – Code Packages	
Teledentistry CDT Code:	**Variations of the following CDT Codes:**
D9995 teledentistry — synchronous; real-time encounter Reported in addition to other procedures (e.g., diagnostic) delivered to the patient on the date of sertvice.	**D0140** – Limited oral evaluation, problem focused
	D0160 – Detailed and extensive oral evaluation
	D0170 – Re-evaluation — limited, problem focused (established patient, not post-operative visit)
	D0171 – Re-evaluation — post-operative visit
	D0190 – Screening of a patient
	D0191 – Assessment of a patient
	D9992 – Dental case management — care coordination
	D9994 – Dental case management — patient education to improve oral health literacy
	D9311 – Consultation with a medical health care professional
• Limited to patients of record	• Limited to 1 per 6 month period • Limited to patients who have not had a D150 in previous 12 months

Table 2. *CDT Code Packages for Synchronous Prevention Visits*

Synchronous Prevention Visits – Code Packages	
Teledentistry CDT Code:	**Variations of the following CDT Codes:**
D9995 teledentistry — synchronous; real-time encounter Reported in addition to other procedures (e.g., diagnostic) delivered to the patient on the date of sertvice.	**D0601** – Caries risk assessment, low risk
	D0602 – Caries risk assessment, moderate risk
	D0603 – Caries risk assessment, high risk
	D0190 – Screening of a patient
	D0191 – Assessment of a patient
	D1310 – Nutritional counseling for control of dental disease
	D1330 – Oral hygiene instructions
	D9992 – Dental case management — care coordination
	D9994 – Dental case management — patient education to improve oral health literacy
• Limited to patients of record	• Limited to 1 per 6 month period • Limited to patients who have not had a D150 in previous 12 months

[k] We acknowledge that while this paper focuses on these three specific applications, there are others that may help dental practices diversify their mix of services.

[l] Synchronous refers to the delivery of health information in real time. This allows for a live discussion with the patient or provider to deliver medical expertise.

[m] Asynchronous refers to the "store-and-forward" technique, where a patient, dentist or dental hygienist collects medical history, images, and care reports or assessments and then sends it to a dentist or dental specialist for diagnostic and treatment expertise.

[n] This analysis used IBM Watson National Medicaid MarketScan (pre-COVID-19) data.

[o] A group of codes, often used to designate payment for services, can be grouped or bundled into a package for all the all the services performed to treat a patient undergoing a specific episode of care. An episode of care is the care delivery process for a certain condition or care delivered within a defined period of time.

effectively integrated in the process. In populations struggling to access dental care, synchronous teledentistry can provide more consistent connection with the dental provider. Through teleprevention, providers can conveniently evaluate and triage dental disease to achieve improved patient management. Patients who cannot access routine diagnostic and preventive dental care risk worsening undetected dental disease, potentially resulting in a dental infection and unnecessary use of emergency departments.

This synchronous encounter is proactive and scheduled rather than a reactive urgent telehealth visit. The integration of primary care and inclusion of health coaching creates opportunities for oral health care teams to adopt these procedures for improved population health.[59, 63-64] Providers can gather important information in a teledentistry portal to help patients understand their risk for oral disease and to promote good oral health through patient education and health coaching.[65] Synchronous visits also create a pathway toward integrated, interprofessional care. The technology can provide the patient with a more interactive care experience with an interdisciplinary team that meets health wants and needs.

This interprofessional operational model can support health information exchanges by synchronizing health records between providers, using common data to diagnose and treat, and facilitating seamless referrals. Advancing health information technology can reduce medication errors and improve treatment outcomes in all health fields.

Component Three: Asynchronous Prevention Visits

Asynchronous preventive visits can expand the reach of providers into communities where their residents do not readily have access to oral health care and provide more convenient and safer services even for those who have, in the past, received regular in-office care. As seen in Table 3, the visit often includes a patient assessment, radiograph or photographic documentation for referral, oral hygiene instructions, a caries risk assessment, a fluoride application, and a prophylaxis[p] with sealant[q] placement. A dentist electronically evaluates the shared documents and images to develop a treatment plan. Later, the findings and treatment plan are communicated back to the patient for discussion and finalization. Asynchronous visits improve access to care, support those at high risk for disease progression, and facilitate convenient dental care.[67-70]

Teleprevention in Dentistry: Next Steps and Conclusion

States need to enact permanent policy changes to sustain the teledentistry infrastructure created during the COVID-19 pandemic temporary emergency orders. Broadband infrastructure and financial capital for dental facilities to purchase technology is especially important in rural and underserved areas. About 24 million households lack access to fast and reliable broadband internet; 80% of those households reside in rural communities.[70-72] This widens an already sizable gap in equitable access to care. Telehealth services could be challenging in low-income communities given unreliable internet services and low health literacy. Despite these challenges, many primary care health clinics in rural and

Table 3. *CDT Code Packages for Asynchronous Prevention Visits*

Asynchronous Prevention Visits – Code Packages	
Teledentistry CDT Code:	**Variations of the following CDT Codes:**
D9996 teledentistry— asynchronous; information stored and forwarded to dentist for subsequent review Reported in addition to other procedures (e.g., diagnostic) delivered to the patient on the date of service.	**D0601** – Caries risk assessment, low risk
	D0602 – Caries risk assessment, moderate risk
	D0603 – Caries risk assessment, high risk
	D0190 – Screening of a patient
	D0191 – Assessment of a patient
	D0210 – Intraoral — complete series of radiographic images
	D0250 – Extraoral — 2D projection radiographic image created using a stationary radiation source, and detector
	D0274 – Bitewings — four radiographic images
	D0330 – Panoramic radiographic image
	D0350 – 2D oral/facial photographic image obtained intra-orally or extra-orally
	D1206 – Topical application of fluoride varnish
	D1208– Topical application of fluoride
	D1330– Oral hygiene instructions
• Limited to patients of record • Limited to 1 per 6 month period • Limited to patients who have not had a D150 in previous 12 months	

[p] A dental prophylaxis is a professional cleaning procedure performed to thoroughly clean the teeth and mitigate disease development or progression.

[q] A thin coating of plastic or other material to protect the pits and fissures on the chewing surface of the teeth from developing cavities.

underserved areas are acquiring telehealth capabilities to consult with other medical health providers and specialists (e.g., mental health, cardiologists, diabetes specialists, etc.). Oral health providers can leverage this increased capacity by developing an "on call" or consulting relationship if the facility does not have an on-site oral health provider. Patients can receive oral health education, evaluation, triage, and referral from a dental provider using teleprevention when the patient is at their medical facility. Some forward-thinking health care systems are evaluating an integrated, wholistic telehealth experience in which a patient could receive an oral health screening during a medical care encounter and be transferred immediately to an oral health provider for evaluation, education, and care coordination.[71-72]

Domain One Cost and Financial Implications

Teledentistry has demonstrated monetary advantages, including patient retention, better value for time spent, reduced overhead costs, and decreased liability. For a system of care to be successful and its participants to understand risk, overall investment from payors and the level of revenue providers can expect should be transparent. The opportunity of teledentistry as a tool for disease prevention holds the most promise in a value-based care design, like shared risk or global budgeting, in which cost savings is necessary to meet financial needs. A breakdown of the component codes associated with telehealth visits is provided, as previously described, including the synchronous urgent visit and the synchronous and asynchronous preventive visit. CDT code combinations are used, along with assumptions/limits on the number of visits and utilization, to estimate the cost and financial implications for businesses operating in a mixed-payor structure. Table 4 summarizes these cost and financial implications of the Domain One code packages for reimbursement and finance (Appendix A). The following section includes details of those implications.

Table 4. *Summary of the Financial Implications of Domain One: Oral Health with Teledentistry*

	Synchronous Urgent Visit		Synchronous Prevention Visit		Asynchronous Prevention Visit	
	Children	Adults	Children	Adults	Children	Adults
Care Package PMPM Estimate at Average Utilization	$0.23	$0.26	$5.63	$1.88	$9.19	$3.08
Estimated Reimbursement Per Visit	$99.54	$74.96	$56.54	$75.09	$123.10	$163.50
Range of Estimates Based on Variations in Utilization	$0.23-$0.33	$0.18-$0.26	$0.63-$6.26	$0.47-$2.83	$1.02-$10.22	$0.77-$4.62
Range of Estimates Based on Variations in Fee Schedules	± 29%	± 29%	± 32%	± 32%	± 8%	± 8%
Current National Average PMPM for In-Office Visits	$0.64	$0.58	$13.45	$3.99	$13.45	$3.99

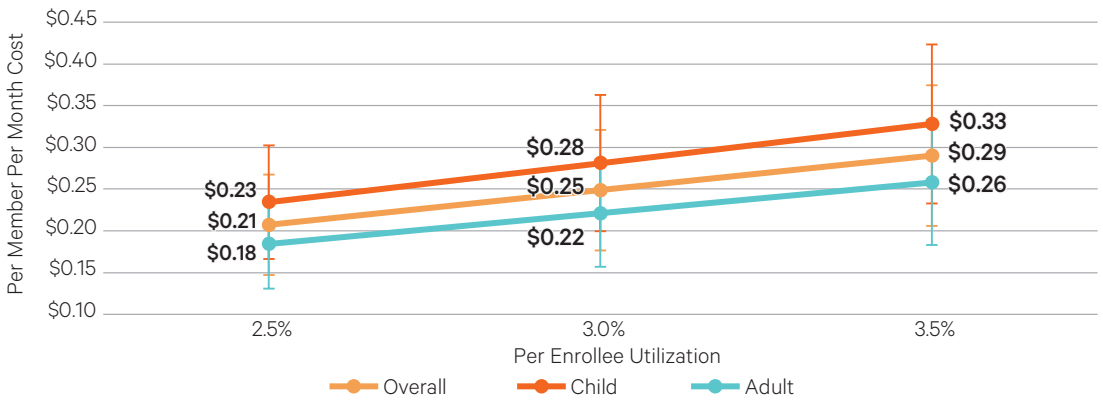


Figure 2. *PMPM Cost of Synchronous Urgent Visit*

Financial Implications:

Synchronous Urgent Telehealth Visit

The emergency telehealth visit may include oral evaluations, screening, assessment, and case management. In order to receive reimbursement from a payor, the provider would use a service code package (Table 1). Several data sources were used to evaluate these proposed coding scenarios[r] (see Methodological Appendix). The estimated per member per month (PMPM)[s] cost is $0.23 for children with 2.5% utilization, and 1.13 visits per year[t] and $0.26 for adults with a utilization of 3.5% and 1.18[u] visits per year. Estimates range from $0.18 to $0.33 PMPM across varying utilization and ages of patients (Figure 2). Implementing a package structure[v] correlates to an average Medicaid reimbursement fee of $99.54 for children and $74.96 for adults. For comparison, national Medicaid data[w] reveals that most state agencies see a cost of $0.64 PMPM or $270 per visit for in-person child emergency dental services, and $0.58 PMPM or $167 per visit for in-person adult dental emergencies. It will be important for payors and oversight entities to continue monitoring waste, fraud, and abuse with the implementation of this approach.

Time per Encounter, Expense, and Clinic/Staff Productivity

It is still unclear how the time and expenses associated with each component of patient encounters will affect staff productivity and profitability. In medicine, the models of time, expense, and productivity are combined in a concept called Relative Value Units (RVUs), which rank the resources used to provide each service on a common scale. Provider RVUs, practice expense RVUs, and (in medicine) malpractice RVUs are common units of assessment. While RVUs are tied to procedure codes in dentistry, we do not extensively consider these factors given the conflicting evidence on the time and expense associated with telehealth, coupled with limited evidence regarding how bundling these services will impact productivity.

Box 1. *Time Per Encounter, Expense, and Clinic/Staff Productivity*

[r] Reports utilized include: National Dental Advisory Service (NDAS) fee report for 2020, average Medicaid reimbursement rates, information on emergency dental visits in Medicaid, and enrollment in Medicaid and CHIP.

[s] Per Member Per Month (PMPM) applies to a revenue or cost for each enrolled member each month. The number of units of something divided by member months is often used to describe premiums or capitated payments to providers, but can also refer to the revenue or cost for each enrolled member each month.

[t] Children (aged 20 and younger) and adults (aged 21 and older) are treated separately under state and federal law, and many states have separate fee schedules for those groups.

[u] These utilization and visits per year metrics correspond to national estimates of utilization for corresponding service categories. For example, 2.5% of all adults enrolled in Medicaid have an emergency or urgent dental visit in a year and they have, on average, 1.18 visits per year.

[v] A payment structure in which different health care providers who are treating you for the same or related conditions are paid an overall sum for taking care of your condition rather than being paid for each individual treatment, test, or procedure.

[w] Based on an analysis of the IBM Watson Medicaid Watson database for 2017.

Financial Implications:
Synchronous Urgent Telehealth Visit

As seen in Table 2, a synchronous teledentistry code is paired with an oral health risk assessment to determine the timing of and frequency with which the patient should seek in-office care. Figure 3 shows PMPM fees that include one telehealth visit every six months and utilization rates of 5–50% of those enrolled (see Methodological Appendix). Each packaged care visit would correlate to an estimated reimbursement of $56.54 for children and $75.09 for adults. For comparison, national Medicaid data reveals that most state agencies see a cost of $13.45 PMPM or $189.41 per visit for preventive and diagnostic services among children and $3.99 PMPM or $172.81 per visit among adults.

The caries risk assessment is a core element of the synchronous prevention visit. This tool helps providers categorize patients by risk and create personalized treatment plans related to risk level. The combination of the telehealth visit, a caries risk assessment, and a personalized treatment plan streamlines the patient experience. In addition, this combination lowers costs by tailoring revisit cycles to patient needs and increases provider engagement with high-risk patients (Appendix B).

Financial Implications:
Asynchronous Evaluation and Management Visit

Projected PMPM fees are outlined in Table 2 include one asynchronous prevention visit every six months; utilization rates of 5-50% of those enrolled were calculated (see Methodological Appendix for calculation description). With 1.5 visits annually and 50% utilization across all ages, the PMPM cost is $10.22 for children at 50% utilization and $3.08 for adults at 50% utilization (Figure 4). Each visit would provide dental care teams a reimbursement of $123.10 for children and $163.50 for adults based on an oral hygiene encounter and a review by a dentist or specialist.

A DQP analysis of a large dental care organization operating within a current value-based care model[x] and employing asynchronous teledentistry demonstrated cost savings associated with this package. A review of 1,516 asynchronous teledentistry visits conducted in an oral hygiene program during 2019 demonstrated that the average dental treatment cost for patients, adjusted within a usual, customary, or reasonable (UCR) fee schedule and following the use of this asynchronous prevention telehealth package is $483 compared to $593 for other dental treatments performed within an office setting. The difference in cost is largely attributed to a reduced need for repetitive diagnostics with expanded minimally invasive care, resulting in fewer restorative and surgical procedures. Taken together, we can conclude asynchronous telehealth oral hygiene visits are an effective solution for providing appropriate care within this VBOHC model.

The broad implementation of asynchronous visits can potentially reduce per patient costs. For patients unable to travel to central clinical sites, this tactic increases access to diagnostic and preventive care. Asynchronous visits may also reduce associated staff and chair time by shifting some patients to telehealth visits. Operational streamlining associated with examinations and obtaining images opens chair time for surgical intervention and expands hours of operation.

PMPM Cost of Synchronous Disease Prevention Telehealth Visit

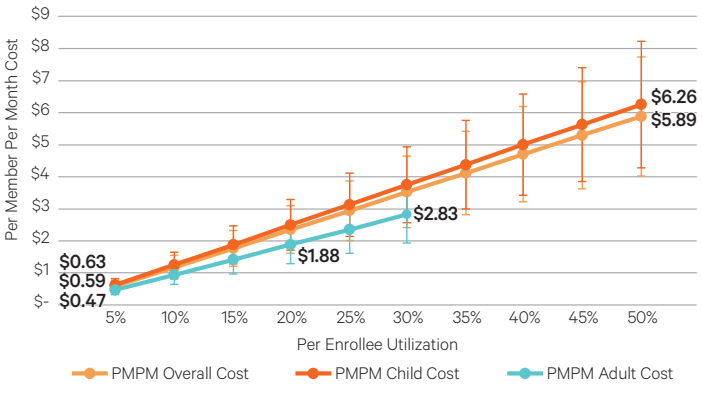


Figure 3. *PMPM Cost of Synchronous Disease Prevention Telehealth VisitVisit.*

PMPM Cost of Asynchronous Preventive Visit

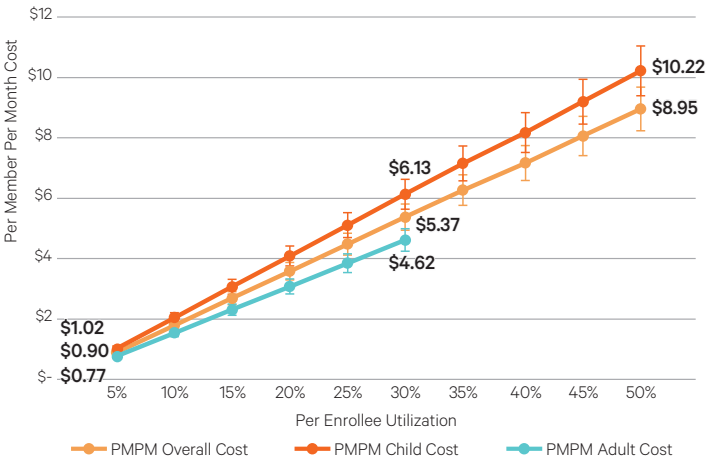


Figure 4. *PMPM Cost of Asynchronous Preventive Visit*

[x] Advantage Dental: https://www.advantagedental.com/.

Domain One Advantages for Patients, Dental Health Care Workers, and Payors

Advantages for Patients

The urgent teledentistry visit provides on-demand access to care when patients need to address acute issues. Currently in dentistry, health assessment and coaching are often associated with community-based programs, involving some form of oral health risk assessment.

Disease prevention and health promotion teleprevention visits, like nutritional guidance and tobacco cessation counseling, can reduce disease risk, particularly within marginalized and vulnerable communities. Data reinforce that a primary care[y] approach initiated within a dental-based encounter can result in all of the following benefits to patients: improved home tooth-brushing habits; reduced high-risk behavior associated with oral diseases; positive views toward preventive dental screenings; reduced new caries experience; improved treatment outcomes; decreased emergency department utilization for nontraumatic dental care; and a healthier oral microbiome.[z, 73-91]

Disease prevention and health promotion teleprevention visits, like nutritional guidance and tobacco cessation counseling, can reduce disease risk, particularly within marginalized and vulnerable communities.

The synchronous teleprevention visit, represented through a service code package (see Appendix A), can include a caries risk assessment, screening, counseling, anticipatory guidance, and case management to improve chronic disease conditions. In a survey assessing patient experience with synchronous visits, 86% of participants expressed general satisfaction and would use the medium again.[92] Results also revealed significant time savings for patients, with the potential to reduce no-show rates:

- 52% of respondents reported that they would need to travel to another city to see a dentist if they hadn't used teledentistry;
- 42% said they would have had to take time off work; and
- 28% of respondents reported they would have needed to find childcare to get in-person care.

Advantages for Dental Health Care Workers (DHCWs)

An analysis of *asynchronous* teleprevention encounters performed for this paper demonstrates that the care provider did not immediately identify a need for a subsequent patient visit. Our analysis of asynchronous teledentistry encounters from a large dental care organization operating within a value-based care model indicated only 24%[aa] of patients returned within 30 days, and another 23% returned for any reason within six months following the oral hygiene visit. Among the 24% that did return within 30 days, roughly half returned for a restorative or oral surgery visit that finalized treatment, higher than average among patients without a teledentistry visit. It is important to note that only 14% of patients returned for an emergency visit, which is comparable to the typical rate for patients. This outcome illustrates how the asynchronous visit can facilitate access to care and does not delay needed care or increase risk to patients.

Temporary rollbacks of regulatory restrictions from all legislative levels in response to the COVID-19 pandemic enabled dental providers to implement virtual care models for patients. This global attention provides a clear pathway for teledentistry. State government agencies, stakeholders, and institutions can use data collected during this time to elevate dental care delivery now and for the future. Telehealth care platforms can expedite chair time or dentist availability for pre-operative consultation, post-care follow-up, or referral management.[93-94] Fewer in-person visits during COVID-19 reduces risk of transmission for patients and providers, thereby facilitating safety and efficacy in dental care while alleviating fear and anxiety experienced by providers during the pandemic.[95-96] A recent report suggests patients are receptive to telehealth visits and find value in connecting with their dental care team, which can lead to improved provider satisfaction.

[y] *Primary care* is the day-to-day health care given by a health care provider acting as the principle point of continuing care for patients within a health care system. *Secondary care* is more specialized and focuses on helping patients who are struggling with more severe or complex health conditions often focused on reducing the need for surgery. *Tertiary care* is a level of health care obtained from specialists or requiring surgical care usually after referral from the providers of primary and secondary care.

[z] The collective genome of microorganisms that reside in the oral cavity. After the gut, it is the second largest microbial community.

[aa] N=363

Advantages for Payors

A robust teleprevention program that reduces unnecessary in-person visits creates safer oral health encounters, mutually benefiting the payor, provider, dental care organizations, and patients. Because payors are under pressure by their clients to improve access, enhance provider networks, and integrate care at lower costs, they can drive the adoption of teledentistry strategies to address client demands. Previous analyses indicate that teledentistry visits improve health, costs, access, and utilization for those in rural areas, school-based settings, and nursing or assisted living communities.[67, 97-99] Diversifying access to care through teleprevention means patients come into an office only when treatment is truly needed while still receiving appropriate assessments and care management. Supporting patient evaluation on a routine basis through teleprevention oral hygiene visits builds success with at-home care and lowers risk of disease. Using this risk-stratified model, some patients may only need a an oral hygiene appointment once per year, resulting in cost-savings for patients and payors. Increased use of teledentistry expands dental services and provider networks, an asset for payors when competing for contracts. Heightened clinical focus on prevention ultimately creates cost savings, particularly in vulnerable communities.

A robust teleprevention program that reduces unnecessary in-person visits creates safer oral health encounters, mutually benefiting the payor, provider, dental care organizations, and patients.

[aa] N=363

Domain One: Strengths, Weaknesses, Opportunities and Threats (SWOT[bb]) Analysis[56-59, 65, 100-107]

The SWOT analysis revealed the main challenges to implementing an integrated, technology-enabled prevention program include: 1) insufficient and inefficient health information technology, 2) limited long-term adoption of teledentistry policy in most states, 3) struggles with technology literacy, and 4) concerns over abuses in telehealth billing practices. Quality improvement practices, improved advocacy at both the federal and state levels, and early reports of satisfaction with technology-enabled dentistry were identified as facilitators to adoption and implementation. Collaborative and integrated approaches are needed to align multiple financial sectors for viability and sustainability.

Domain One SWOT Analysis

Strengths

- Quality improvement processes already used within oral health can assist with change management
- Strategies and best practices have been identified for improving proficiency and efficiency of care delivery
- Early reports of teledentistry reveal patient and provider satisfaction with reinforced consumer confidence
- Increased opportunities for collaborative decision-making between providers and patients
- More efficient dental specialty referrals, consultations, and initial assessments through online and telehealth platforms

Weaknesses

- Limited staffing due to furloughs and/or DHCWs opting to not return to work
- Lack of industry-wide consensus on measurement, reporting and record keeping for accountability
- The deficiencies in health information technology and real time data reporting must be addressed for financial sustainability
- Reliance on technology can create age-based inequalities
- Lack of diagnosis code utilization in dentistry

S W O T

Opportunities

- Regulatory changes in the government's response to COVID-19 eased operational challenges for teledentistry
- Most Americans have mobile telephones (81%)
- Increased acceptance and push for Medicare telehealth coverage to expand to teledentistry services
- The development of "smart home" concepts, smart toothbrushes, and home health monitoring can assist with improved health
- Coordinated medical-dental/ interprofessional management of chronic systemic disease through oral health assessment screening, prevention education

Threats

- Growing concerns over abuses in telehealth billing practices
- Lack of dental license reciprocity/portability across states
- Ambiguity in state guidelines for specific coverage allowances has created confusion on reimbursement and impaired revenue cycle management
- Uncertainty if patients will continue wanting teledentistry visits
- Potential rollback of coverage and regulatory changes could hinder long-term implementation of teledentistry
- 24 million households lack access to fast and reliable broadband internet (disproportionate rural impact)
- Lack of adequate interoperability and overall information technology in dentistry

[bb] A SWOT analysis is a strategic planning method utilized to categorize and evaluate strengths, weaknesses, opportunities, and threats related to project planning and success.

Domain Two: Minimally Invasive Care

Domain Two Clinical Guidance

Domain Two focuses on minimally invasive care that reverses or slows early disease stages using a program of collaborative decision-making with patients. The implementation of Minimally Invasive Care (MIC) to prevent or slow disease has been successful in community-based programs, like community health centers, childcare settings, and/or dental care sites participating in alternative payment models as well as used often in European routine dental care settings.[72, 108-109] These programs often perform risk-stratified care[cc] to identify and discuss health contributors with patients as part of a care team.[86] Using MIC to promote remineralization[dd] or gains in periodontal attachment[ee] is particularly valuable, notably at the population level, in improving systemic health and impacting cost.[110-112] These proactive processes promote patient wellness through management of chronic disease. In turn, this process drives enhanced outcomes beyond today's approach of largely reactive interventions to acute pathologies. Dental public health and oral health stakeholders seek to maximize disease prevention and treatment methods that are safe, simple, effective, and affordable. These approaches should be offered in a variety of settings and by multiple members of a dental treatment team. Domain Two offers three code or service packages of oral health care delivery: ***caries prevention encounter package, the caries management encounter package, and the periodontal management encounter package***.

Evidence supports procedures that limit the use of a dental drill, including compressed air or water, microabrasion[ff], laser therapy, or an ultrasonic handpiece[gg] to treat certain types of caries and periodontitis.[113-119] The principle limitation for minimal aerosol-producing caries treatment is a cavitated tooth that

[cc] Risk Stratified care management (RSCM) is the process of assigning a health risk status to a patient and using the patient's risk status to direct and improve care. The goal of RSCM is to help patients achieve the best health and quality of life possible by preventing chronic disease, stabilizing current chronic conditions, and preventing acceleration to higher-risk categories and higher associated costs.

[dd] Tooth remineralization is the natural or agent assisted repair process for noncavitated tooth lesions or breakdown of tooth surface integrity.

[ee] The reattachment of periodontal tissues that had been lost to periodontitis or gum disease.

[ff] Microabrasion is a quick and painless solution for removing yellow, white, or brown spots, stains, and discolorations on the teeth.

[gg] An ultrasonic instrument with a tip for supplying high-frequency vibrations, used to remove plaque and calculus from teeth and bits of inflamed tissue from the walls of the gingival crevice.

cannot be cleaned or the active lesion is inaccessible. All other lesions without pulpal involvement can be managed using limited aerosol production and/or with minimal or no tissue removal. While the application of many MIC agents produces fewer aerosols, providers have traditionally implemented these procedures after using the air/water syringe for cleaning and drying the tooth.[120] Even though modifications to existing protocols can reduce aerosols for some techniques to manage noncavitated lesions, the benefits or detriments of these changes are currently unknown. It will be imperative for the profession to continually monitor changes to clinically proven infection control protocols and ensure that providers implement best-evidence techniques for these products in the wake of the COVID-19 pandemic.

The COVID-19 environment propelled the need for a greater emphasis and value on less technically complex care. States and professional organizations should commit to seeking policy for acceptable reimbursement and budget appropriations in support of these interventions. State and national health agencies must address the incentivization of surgical approaches through payment reform to shift dentistry away from more expensive surgical interventions. This shift toward valuing prevention, SDOH, and better health rather than invasive treatment, volume of services, or acute care, known as VBOHC, is a critical element of oral health's future.[121] VBOHC shifts from the common quantity-based payment systems (e.g. fee-for-service) to payment models that value high-quality care and oral health outcomes.[122] The Value-Based Care (VBC) model, already used in medicine, improves care quality and reduces wasteful spending within the overall system.[123] Provider reimbursement under the VBC model is designed to reduce disease burden, improve quality of care, and patient satisfaction, while ultimately lowering the cost of care.[124]

Domain Two Financial Implications

The incentives of traditional fee-for-service dentistry place value on a high quota of surgical procedures and maintaining high patient volume. These incentives often reward expensive restorative care (e.g., crowns or multi-surface filings).[121] In VBOHC, monetary incentives are not associated with surgical interventions and high-volume procedures. Reducing surgical interventions not only improves patient health outcomes, but corresponds with decreased chair availability as a result of new infection control processes, social distancing, and effective aerosol management.

As described in Tables 5 and 6, Domain Two consists of three code packages that implement a minimally invasive methodology to caries prevention, caries management, and periodontal management. The PMPM cost of these packages is calculated similarly to those packages described in Domain One (see Methodological Appendix for detail) and is summarized in Table 6.

Table 5. *Care Model Activities and Code Packages for Domain Two*

Domain	Activities	Services
Domain 2: Minimally Invasive Care	Implement a minimally aerosol producing approach to caries and periodontal management as well as noninvasive care maintenance Care coordination and development of new business models for specialty referrals	Care intervals and minimally invasive treatment approaches reflecting individual patient risk level and needs. The following service combinations may be in conjunction with an examination (**D0120, D0140, D0150, D0160, D0170**) or screening (**D0190** or **D0191**). **Caries Prevention** Diagnostic: **D0417, D0418, D0425, D0601, D0602, D0603** Preventive: **D1206, D1208, D1310, D1320, D1330** May also include: **D1351** **Caries Management** Preventive: **D1206, D1208, D1310, D1320, D1330** Restorative: **D2930** (Hall Technique), **D2940** Adjunctive General: **D9630, D9992, D9993, D9994** May also include: **D1354** **Periodontal Management** Preventive: **D1310, D1320, D1330** Perio: **D4910** Adjunctive General: **D9310, D9311, D9630, D9910, D9991, D9992, D9993, D9994**

Table 6. *Summary of the Financial Implications of Domain Two: Minimally Invasive Care*

	Caries Prevention Encounter Package		Caries Management Encounter Package		Periodontal Management Encounter Package	
	Children	Adults	Children	Adults	Children	Adults
Package PMPM Estimate at Average Utilization	$5.78	$2.61	$4.11	$4.03	$0.17	$7.51
Reimbursement Per Visit	$138.80	$104.50	$214.20	$161.30	$199.60	$174.92
Range of Estimates Based on Variations in Utilization	$0.58-$5.78	$0.44-$2.61	$0.89-$8.92	$0.67-$4.03	$0.17-$3.33	$0.28-$7.51
Range of Estimates Based on Variations in Fee Schedules	± 4%	± 4%	± 8%	± 8%	± 6%	± 6%

The ***caries prevention encounter package*** includes a patient examination or screening, a caries risk assessment, evaluation of susceptibility to oral diseases, oral hygiene instruction, and fluoride varnish application. Assuming one visit per year with utilization of 50% for children and 30% for adults results in PMPM costs of $5.78 and $2.61, respectively (Figure 5, see Methodological Appendix for details), each visit would provide dental care teams with a correlated reimbursement of $138.80 for children and $104.50 for adults. As seen in Box 2, sealant placement may be included in this package, depending on the type of benefit design being employed with a given plan.

Providers should utilize the caries management encounter package instead of the caries prevention package for reimbursement when identifying carious lesion(s) during an examination. The ***caries management encounter package*** includes a patient examination or screening, oral hygiene instruction, fluoride varnish application, minimally invasive techniques, and oral health case management. Assuming one visit per year[hh] with utilization of 15% for children and 8% for adults, the average utilization of caries restorative services in the national Medicaid samples results in PMPM costs of $2.68 and $1.08, respectively (Figure 6, see Methodological Appendix for details). If the system expanded utilization to 23% for children and 30% for adults, corresponding to the rate of untreated dental caries in the population, PMPM costs would be $4.11 and $4.03, respectively.[128] Each visit would provide dental care teams with a correlated reimbursement of $214.20 for children and $161.30 for adults. As seen in Box 3, silver diamine fluoride administration as a caries arrest agent also can be included within a caries management package or plan.

Sealants

Sealants[126-127] are an important modality for preventing caries in primary and permanent molars and are recommended for application on the occlusal surfaces in children and adolescents. While sealant applications cost more in the short term, they have been shown to reduce the number and severity of needed restorations and cost less in the long-term. Assuming 50% utilization, the additional estimated PMPM costs of including sealants on primary and permanent molars in the caries prevention package for children is $1.31.

Box 2. *Sealants*

PMPM Cost of Caries Prevention Encounter Package

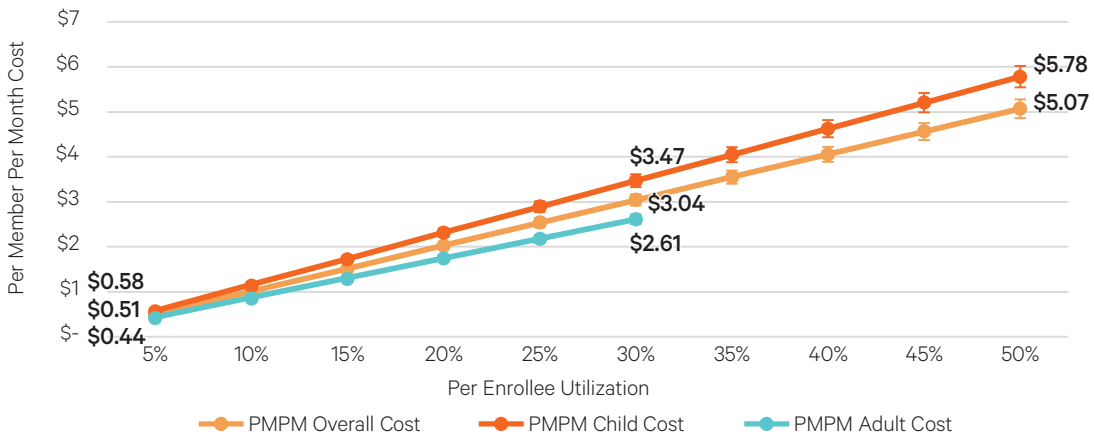


Figure 5. *PMPM Cost of Caries Prevention Encounter Package*

[hh] Based on single interventions, the needed number of encounters should be determined according to local populations, scope of practice, and available budget.

PMPM Cost of Caries Management Encounter Package

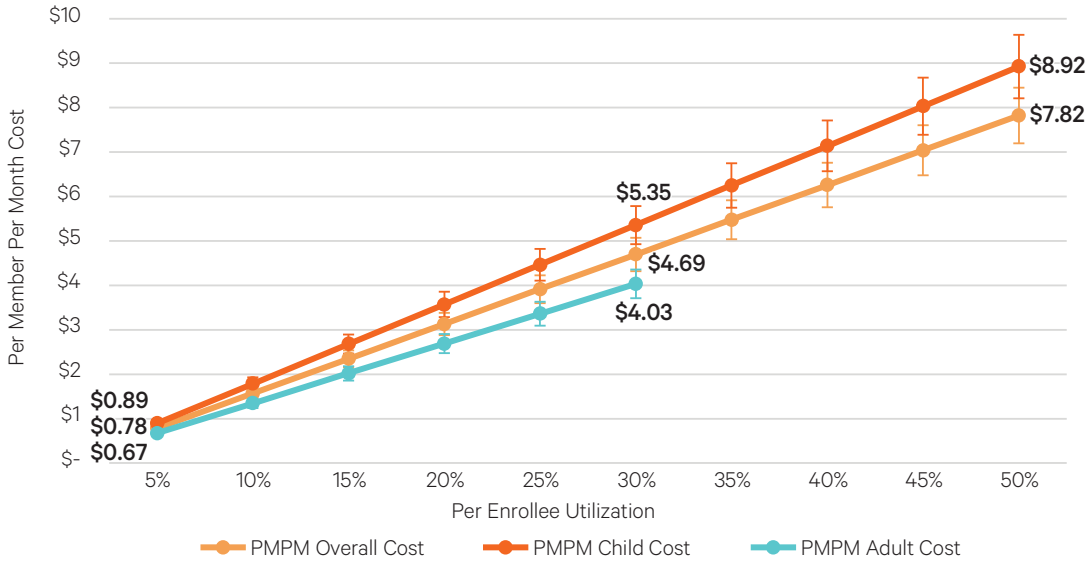


Figure 6. *PMPM Cost of Caries Management Encounter Package*

PMPM Cost of Periodontal Management Encounter Package

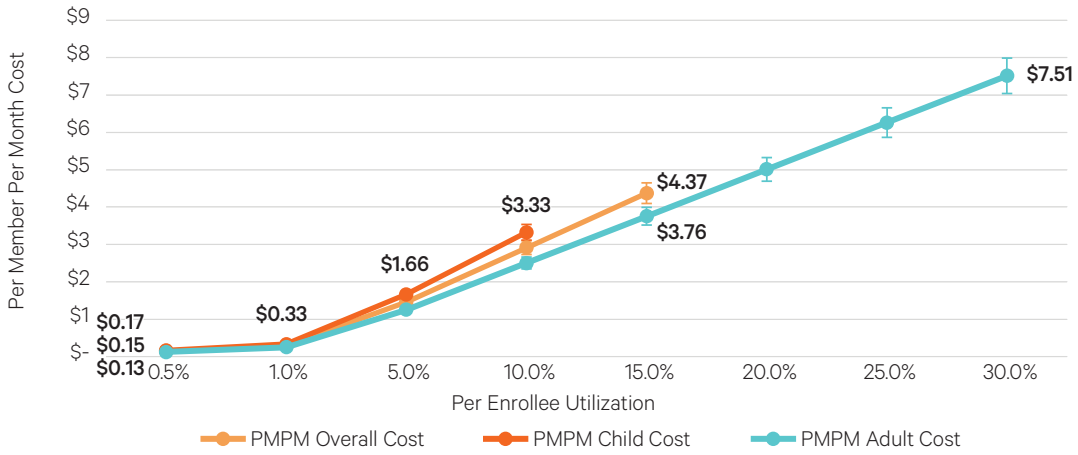


Figure 7. *PMPM Cost of Periodontal Management Encounter Package*

The ***periodontal management encounter package*** can be used either separately or in combination with the caries prevention or caries management encounter packets. The package includes an evaluation or screening of a patient, oral hygiene instructions, periodontal maintenance, referral to specialists as needed, and dental case management. Assuming two visits per year with utilization of 1% for adults, the average proportion of adults receiving periodontal treatment within a national Medicaid sample, PMPM costs would be $0.33 (Figure 7, see Methodological Appendix for details). If the system expands utilization to 30% to capture a greater proportion of the adults in need (42% of low-income adults are estimated to have untreated periodontal disease), PMPM would increase to $7.51 among adults.[132] Each visit would provide dental care teams with a correlated reimbursement of $150.30 for adults.

Domain Two Advantages to Patients, DHCWs, and Payors

Advantages to Patients

Minimally Invasive Care (MIC) provides patients with more control over their oral health by slowing progressive disease effects and creating more time for healthy behavior change, thereby preventing the need for surgical intervention.[133] MIC techniques steer the process away from "replacement dentistry," wherein the cavity gets larger and the tooth gets weaker through repeated dental interventions with active underlying disease.[134-139] Since restorative materials used by dental providers are not complete or adequate replacements for tooth structure, preserving as much of the natural tissues as possible is important for long-term patient health.[140-141] Data about MIC indicate that patients reported better oral health and expressed satisfaction with both alternative caries management techniques and the aesthetic appearance following glass ionomer utilization[ii]. For pediatric patients, parents and caregivers preferred the use of silver diamine fluoride as part of MIC, over behavior modification techniques or sedation procedures.[142-145] Parents and caregivers are more accepting of minimally invasive procedures given the reductions in pain, fear, and trauma experienced during dental treatment. As a long-term benefit, these patients gradually accept and tolerate more involved dental care.[146-149]

Silver Diamine Fluoride

Silver Diamine Fluoride (SDF)[129-131] can successfully arrest caries in both children and adults. Clinical guidelines suggest one to two applications per year on teeth with carious lesions. Assuming 15% utilization, the associated additional cost of including SDF in the caries management encounter package is $.50 PMPM per application, per tooth.

Box 3. *Silver Diamine Fluoride*

Periodontal Prevention and Management

Periodontal disease[5,6, 132] is directly linked to several systemic conditions, including cardiovascular disease, type 2 diabetes, pneumonia, dementia, and adverse pregnancy outcomes. Periodontal interventions also have been tied to substantial cost savings for the treatment of system conditions, especially type 2 diabetes. However, fewer than half of state Medicaid plans currently cover periodontal services for adults. Therefore, we do not propose additional bundles related to periodontal care beyond maintenance and management. Given the vital importance of managing periodontal diseases, there is a need to expand benefit structures around periodontal prevention application, per tooth.

Box 4. *Periodontal Prevention and Management*

[ii] Associated with the first sign of caries-like lesion on enamel that can be detected with the naked eye as a milky white opacity when located on smooth surfaces.

Advantages to Providers

MIC generates cost savings with improved overhead management[jj], expanded service delivery, and decreased patient infection risk.[150-151] Common agents incorporated with minimally invasive care include silver diamine fluoride (SDF)[kk], glass ionomer[ll], and remineralization agents. Several evidence-based techniques are currently available that support minimally invasive care in dentistry:

- Providers can minimize aerosol generation with SDF application simply by drying with cotton instead of using compressed air and not rinsing.
- Providers can place glass ionomer with limited aerosol production because it bonds to demineralized tooth structures, facilitating partial caries excavation using hand instruments as in
  - Atraumatic Restorative Treatment (ART);
  - Interim Therapeutic Restorations (ITR);
  - Silver Modified Atraumatic Restorative Treatment (SMART), or
  - the Hall techniquemm.[152-154]
- Providers can utilize calcium silicate cements like Mineral Trioxide Aggregate (MTA)[nn] and glass ionomer in the ART/ITR approach.[155]
- Providers can place glass ionomer in a non-dry tooth rather than the extremely dry environment required by most composite resins[oo], a priority for treatment or preventive sealants.[pp]

Ideally, team-based care delivery should support these procedures to expand dentist availability to perform more complicated procedures that also carry a greater overhead cost.[156-163] Practices can maximize workforce efforts to improve the availability of the dentist while aligning roles with the level of license and practice.[164-167]

Advantages to Payors

In a recent survey, 100% of Medicaid dental administrators and 70% of employers that purchase dental benefits agreed it was very important to access preventive dentistry for improving overall health.[18] In the same report, the majority of Medicaid dental administrators (68%) stated that more comprehensive prevention strategies are the most important benefit of future dental coverage.

Traditional benefit packages may not standardize the service codes associated with MIC. These packages are not designed to provide reimbursement for the bundled procedures with high financial value (revenue that provides financial sustainability will create lower costs to the system), compared with restorative or surgical procedures. Including these procedures in public and commercial plans helps payors focus on safe and valued treatment options. In turn, payors can support both population health and personalized care[qq] pathways based on risk, individual needs, and shared decision making.[168-170] Payors should design benefits that allow flexible coverage and service frequency, permitting providers to individualize care, focus on prevention, and maintain cash flow.

[jj] Refers to the ongoing expense of operating a business.

[kk] SDF is a topical medication used to treat and prevent dental caries and relieve dentinal hypersensitivity.

[ll] Glass ionomer cement is a restorative material used as a filling material and luting cement. It has the additional benefit of leaching fluoride to the adjacent tooth structure, which provides some protection against recurrent caries.

[mm] The Hall Technique is a noninvasive treatment for decayed baby back (molar) teeth. Decay is sealed under preformed (stainless steel) crowns, avoiding injections and drilling. It is one of many biologically-orientated strategies for managing dental decay.

[nn] Mineral trioxide aggregate (MTA) is a biocompatible repair material that is often used along with glass ionomer cement.

[oo] Often referred to as tooth colored filling materials, composite resins are types of synthetic resins that are used in dentistry as restorative material or adhesives.

[pp] A caveat: you may need to replace the GI sealant more frequently, because they wear more and retention is generally the criteria for replacement or repair given that other metrics are unreliable (unless a large lesion develops).

[qq] Personalized health care (PHC) is an overarching framework for care that unifies predictive technologies with an engaged patient to coordinate care, with the primary aim of promoting health and preventing disease.

Domain Two SWOT Analysis[134-141, 171-179]

Support from respected medical and dental organizations, growth of interprofessional practice of primary and secondary care in the oral health sector, and new agents or technology that facilitate the provision of more financially beneficial procedures were identified as process enablers through the SWOT analysis. Lack of consistent reimbursement from third party payers, lack of willingness and preparedness among dentists to incorporate primary and secondary care structures within existing dental business models, and a scarcity of in-the-field piloting and available publications to understand real world implications have been identified as challenges to overcome Domain Two processes to be successful.

Domain Two SWOT Analysis

Strengths

- Increased acceptance and availability of MIC agents, resources, and reimbursement mechanisms help to usher access
- The need to decrease aerosol risk can encourage less invasive treatments
- Less invasive treatments can reduce patient anxiety and fear (about pain, cost, time spent in treatment, etc.) and offer more affordable alternatives
- There is support, recommendations and guidelines for minimally invasive care from respected medical and dental organizations such as the FDI World Dental Federation and the American Academy of Pediatric Dentistry

Weaknesses

- Traditional forms of dental care delivery and financing focus on acute need and depend on surgical intervention procedures to stop disease progression
- The need for change management and operational adjustments versus the time available to introduce new procedures/processes will most likely need to be addressed in various ways throughout the health care ecosystem
- Less awareness from patients and fewer patient-facing resources for discussing prevention and MIC due to their lack of current widespread use
- DHCWs are more likely to focus on more advanced disease and acute care rather than preventive processes

S W O T

Opportunities

- Implementing needs-based service planning will equip the workforce to provide convenient quality care
- Increase patient education on MIC safety and effectiveness
- Advocacy for health and prevention payment reform that focuses on health outcomes, better ROI, and an improved care experience
- There is an ongoing need for new and improved disease detection devices and agents as well as improved remineralization therapeutics
- More funding options for both pilot programs and subsequent implementation of MIC agents, devices, and operations (its impact on community access and portability of care)
- Ability to align treatment options with patient values and preferences (prevention, lower costs, etc.)

Threats

- Current lack of availability of and consensus toward COVID-19 tests in dental care sites
- Unpredictable supply chain and availability of PPE and other supplies impairs effective strategic planning
- Widening disparities in care delivery and little focus on addressing social determinants of health will limit the overall impact of oral health on overall health
- New reimbursement avenues for MIC are associated with low fees and cap-limitations factors that could antagonize dental providers
- Practitioners' concerns that if providing non-invasive care isn't fully effective, it will lead to negative patient or peer attitudes, harmful business reviews, or perceived operation outside standards of care

Domain Three: Personalized and Integrated Intervention

Domain Three Clinical Guidance

The pre-existing health care paradigm shift accelerated by COVID-19 includes consumer habit changes, focus on chronic disease management, politicization of U.S. health care, increased provider burnout and dissatisfaction, and the health care cost crisis. This shift has forced the marketplace to reevaluate and change operational and financial systems along with their management. The role of patients is starting to change as they seek a less drill-and-fill approach by becoming co-designers of health. This evolution is well summarized as moving from "What is the matter with you?" to "What matters to you?"[180] It is supported by detecting and treating disease or injury as soon as possible to halt or slow its progress, encouraging personal strategies to prevent reinjury or recurrence, as well as implementing programs to return people to their original health and function. While personalized care often is linked to prevention, surgical intervention modalities such as 3-D printing and modeling, materials management, advanced imaging, genetics, laser application, and the goal of maintaining the greatest amount of natural tissues will drive surgical dental care into the future. In addition, improved personalized strategies with an integrated approach should prolong the integrity of restorative materials as well as the longevity of surgical interventions.

This transition will not be an easy process. It could take several years because the disease burden of oral health is greater than in other health care sectors, and this is especially true for Medicaid, Medicare, and the dual-eligible populations.[181-183] Moreover, dental patients were experiencing long waiting lists and backlogs of incomplete treatment plans prior to the COVID-19 pandemic. Many patient conditions will have been exacerbated by the additional delay in treatment between the shutdown period and resumption of surgical dentistry. Even after using teledentistry, MIC, and triaging emergent patients, the additional attention to infection control will limit capacity to provide more invasive procedures. Therefore, scheduling and effective time management for surgical interventions will be paramount for successful operation in Domain Three. Prior to COVID-19, scheduling guidance recommended that general dentist practitioners focusing on commercial insurance or self-pay patients see between 8 and 12 patients per day.

While Domain Three reinforces compliance with infection control best practices, this domain's overarching goal is to implement a more personalized and integrated delivery of dental and oral health care, including the recognition that overall health and oral health are inextricably linked.

Consequently, and often, safety net clinics must see a higher volume to offset lower reimbursement. Safety net clinics aim for 1.7 patients per dentist FTE hour (or 1314 patients per day) and 1.2 patient encounters per dental hygienist FTE hour (or 8–10 patients per day).[184-185] The pandemic caused dental practices to adjust their operations, and the pre-COVID-19 operational numbers have not been reported.

Some dental practice operational adjustments included expanded clinical hours to offset patient turnover time, extending appointment times to increase the number of procedures that could be completed in one appointment, and using technology and advanced agents to lower overhead costs. Paramount to the implementation of Domain Three is appropriate and progressive use of infection control processes.[186-198] In today's COVID-19 environment, it is vital for providers to follow and remain updated on professional guidelines, while complying with state and local regulations. For patients to return to the dental office for surgical (and other) procedures, patients need to trust that their dental office is safe. Providers need to assure patients of strict adherence to infection control practices that effectively mitigate the risk of infection. A recently-created infection control document for oral health professionals provides a checklist of guidelines for the safe operation of dental practices.

While Domain Three reinforces compliance with infection control best practices, this domain's overarching goal is to implement a more personalized and integrated delivery of dental and oral health care, including the recognition that overall health and oral health are inextricably linked. This interdependency is critical to a primary care model that focuses on both improving oral health and overall health. Tissue health and structural integrity in the mouth can be altered by poor systemic health (and vice versa). Integrated care teams, which include community health workers, should function closely to manage individual care plans, align with the seven shared principles of primary care[rr], and implement a personalized health process.[199] Integrated care is best accomplished by implementing patient-centered health care delivery, personalized health planning (PHP), analytics, shared decision-making, and patient engagement to encourage healthy behaviors throughout a lifetime.[200-204]

Domain Three Advantages to Patients, DHCWs, and Payors

Advantages to Patients

Integrated and personalized approaches to care improve the delivery of oral health. When this wholistic method is applied to health care delivery, patients are more likely to express satisfaction with the encounter.[18, 205-206] Patients exhibited increased knowledge of their own health contributors when oral health was integrated within a medical care visit. In these visits, patients were especially satisfied with the increased convenience and streamlined care delivery within an integrated oral health visit.[207]

Despite the necessary shift away from prioritizing surgical intervention as seen in Domains One and Two, not all cavitated lesions are easily self-cleansable or respond well to all MIC agents. Because of this, surgical intervention will remain a necessary component of dental care. Patients will continue to desire a safe environment and will value infection control practices at care facilities that mitigate virus spread when surgical intervention is unavoidable. The advancement of technology in oral health has resulted in more rapid placement of crowns and dentures. In addition, advances in imaging and diagnostics make it easier to find disease earlier, which promotes less natural tissue loss.

[rr] The seven shared principles of primary care consist of personal and family centered, continuous, comprehensive and equitable, team-based and collaborative, coordinated and integrated, accessible, and high value.

Advantages to DHCWs

Care teams have increased adoption of integrated and personalized oral health, albeit in small cohorts, either through participation in a value-based dental benefit plan or by initiating membership/subscriber plans as a small business. Providers and care teams report higher satisfaction when personalized planning is implemented.[209- 212] Recent data support providers are responsive to an integrated process, desire better screening and referral processes by interprofessional practices, and favor improved communication.[209] Moreover, evidence suggests care providers have effectively leveraged improved quality of care with increased financial bonuses.[210] Similarly, financial stability is observed with operations and care team salaries, especially when providers are affiliated with a group network or dental service organizations operating within an integrated and value-over-volume financial structure.[210-212]

Domain Three offers an approach that mitigates infection risk to surgical providers. Embedded in this domain is a long-term safety framework to address other pathogens beyond the SARS-CoV-2 virus. Inhalation of surgically produced airborne particles and aerosols may cause adverse respiratory health effects and bidirectional disease transmission in patients and dental providers.[213-219] In 2019, West Virginia University and the National Institute for Occupational Safety and Health announced a partnership to study how potentially harmful "microscopic, airborne particulate and gases are generated during dental procedures."[220] Dental aerosols can include oral microflora, which data have shown are linked to many respiratory issues including sinusitis, rhinorrhea, and headaches.[221-227] Studies have identified clusters of dental personnel treated for idiopathic pulmonary fibrosis.[ss, 228-232] Given that surgical intervention will remain a necessary component of patient dental care regardless of COVID-19, dental practices should consider ensuring infection control practices supporting Domain Three.

Advantages to Payors

Personalized care plans effectively decrease the number of ED visits, reduce health care expenditures, and are well-received by network providers.[233] In addition, medical-dental integration can produce significant cost savings to the overall health system by addressing undiagnosed systemic disease and guiding chronic disease management. In fact, the CDC has recently reported yearly savings could reach as high at $100M if screenings for diabetes, high blood pressure, and high cholesterol occurred during dental care visits.[234] When oral health is a component of well-child visits, earlier intervention with disease processes and promotion of healthy behaviors lead to better health outcomes.[235] As an acceleration in the convergence of medical and dental benefit designs occurs, cost savings as a result of oral health integration will increase the value of these programs during the current paradigm shift.

Medical-dental integration can produce significant cost savings to the overall health system by addressing undiagnosed systemic disease and guiding chronic disease management.

Third party dental benefit payors must provide a safe and effective network of DHCWs to clients and members. Reducing surgical interventions by prioritizing prevention and MIC described in Domains One and Two will result in less costly care, both in the immediate and long term future. A healthier mouth and body, as well as preservation of tooth and gum tissue, can also lead to longer lasting restorations and improved surgical outcomes. Benefit organizations significantly shape ongoing credentialing efforts while overseeing waste, fraud, and abuse to achieve quality care goals. Enrollees participating in oral health plans desire a safe dental encounter during the pandemic and beyond. Provider attention to infection control and a reduction in aerosol exposure is paramount in today's environment.[238-241] In addition, the advancement of digital dentistry[tt] can help achieve goals related to the Quadruple Aim with better outcomes, shorter appointment processes, and better opportunities for education and knowledge development.

[ss] A form of chronic, progressive fibrosing interstitial pneumonia of unknown cause is characterized by unexplained labored breathing and a nonproductive cough.

[tt] Digital dentistry may be defined in a broad scope as any dental technology or device that incorporates digital or computer-controlled components in contrast to that of mechanical or electrical alone.

Domain Three SWOT Analysis[213, 242-253]

The SWOT analysis for Domain Three concluded that limited operationalization of social determinants of health, a lack of interoperability related to electronic health records, and limited access with increased cost of personal protective equipment (PPE) will strain change management and capital for investment. Slow workforce advancement and limited staffing due to COVID-19 staff furloughs impact operations and workflow. Lastly, inconsistencies in patient willingness to co-design and participate in oral as well as overall individual health hinder progress. Programs and frameworks that are readily available for interprofessional practice and medical-dental integration, increased use of and patient desire for data-driven insights for health decision-making, and advances in algorithm-based software to improve scheduling and operational management are positioned to effectively advance an integrated and personalized oral health approach.

Domain Three SWOT Analysis

The Recovery Benefits of the Domain Framework

We present projections of Medicaid spending through the end of 2022 in Tables 7 and 8 and Figures 8 and 9. We based these projections on various scenarios and compared them to the Centers for Medicare & Medicaid Services (CMS) pre-COVID-19 projections of dental spending for the same time period.[254] We focus on Medicaid dental spending in this section since the effects of the domain framework impact this population considerably; however, the effects of the domains approach may hold in true within other markets beyond Medicaid.[255] Importantly, these projections depend on several assumptions, which are outlined in the Methodological Appendix, and can vary greatly depending on a variety of factors: the progression of the COVID-19 pandemic, consumer habits, changes in Medicaid enrollments, state Medicaid budgets, and federal support for Medicaid and dental spending. Thus, the reader should interpret these projections with caution.

Table 7 and Figure 8 assume a continual recovery, with no additional need to close dental practices to in-person dental visits due to future waves of COVID-19. In Scenario A, we project a slow recovery that matches 80% of projections by May 2021, and 95% of projections by 2022 .[255-256] Scenario A assumes no other changes in Medicaid enrollment or benefits, which is unrealistic but serves an important baseline with which to layer complexity. Scenario B assumes that Medicaid enrollment will increase as unemployment increases; however, that spending will ultimately decrease if state legislatures cut optional benefits and reimbursement rates, particularly for adults, pregnant women, and those with special health care needs (Figure 8).[257-258] Scenario C assumes that states begin to implement the Domains in the first quarter of 2021, with the expanded use of the packages resulting in increased utilization at a lower PMPM cost (Figure 8).

Table 8 and Figure 9 assume a second wave of COVID-19 that requires partial closure of dental practices for in-person dental care in many states toward the end of 2020 and into the beginning of 2021. Although it is impossible to accurately predict the future, our modeling assumes a decrease in dental spending to 30% of projections in January 2021, associated with new restrictions and a slower return to previous norms of dental care delivery, and 80% of projections by May 2022 as more practices close permanently. The packages incorporated within the three domains allow continued operation in the COVID-19 environment. Widespread adoption of the domain framework would allow practices to maintain their operations and hopefully increase utilization of care for those at greatest risk for oral diseases, even in the face of a resurgence and future pandemic (Figure 9).

Table 7. *Total Projected Medicaid/CHIP Dental Expenditures in Billions*

	Q4 2020	2021	2022
CMS Projection (pre-COVID-19)	**$3.47**	**$15.30**	**$16.20**
Scenario A: Medicaid dental spending recovers to 80% by May 2021, and 95% by May 2022	**$2.63**	**$12.64**	**$15.20**
Scenario B: Scenario A, but affected by increase in enrollment and reductions in benefit coverage	**$2.50**	**$11.50**	**$13.62**
Scenario C: Scenario B, but with widespread adoption of domains	**$2.50**	**$12.76**	**$15.67**

Table 8. *Total Projected Medicaid Dental Expenditures in Billions, Assuming Second COVID-19 Wave*

	Q4 2020	2021	2022
CMS Projection (pre-COVID-19)	**$3.47**	**$15.30**	**$16.20**
Scenario A: Medicaid dental spending recovers to 80% by May 2022	**$1.62**	**$10.21**	**$12.85**
Scenario B: Scenario A, but affected by increase in enrollment and reductions in benefit coverage	**$1.55**	**$9.29**	**$11.52**
Scenario C: Scenario B, but with widespread adoption of domains	**$1.55**	**$12.24**	**$15. 67**

Total Projected Medicaid Dental Expenditure in Billions

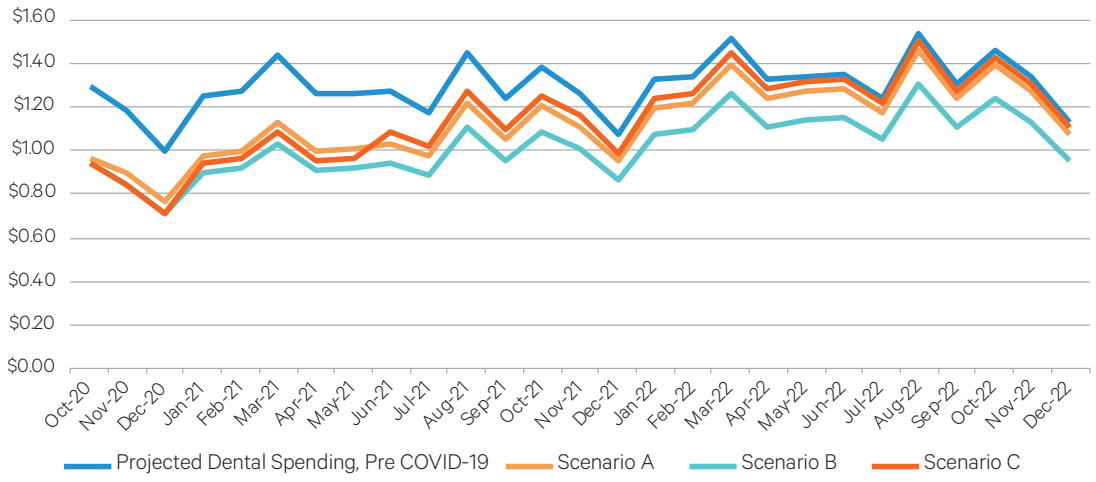


Figure 8. *Total Projected Medicaid Dental Expenditure in Billions*

Total Projected Medicaid Dental Expenditure in Billions

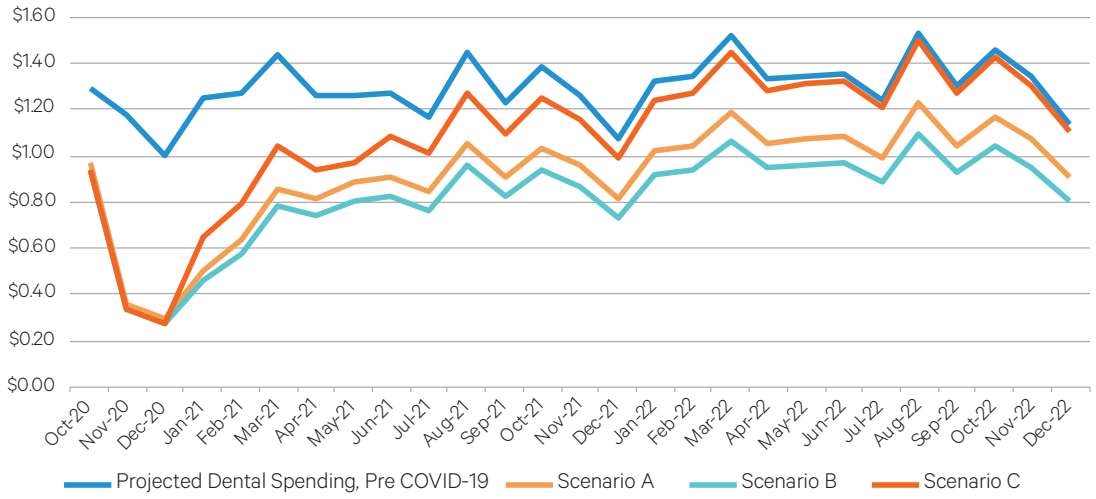


Figure 9. *Total Projected Medicaid Dental Expenditure in Billions*

Next Steps for Implementation

The CareQuest Institute for Oral Health is taking significant steps to support providers, patients, payors, and other key stakeholders to transition care delivery using the domain framework for oral health. The planned activities below will occur in the coming years, with data collection and analysis informing a stepwise implementation of this approach.

Short-Term:

- Introduce financial strategies and associated billing structures to remain flexible and responsive during the changing dental landscape.
- Establish interprofessional care team designs to support oral health case management and care-coordination efforts.
- Redefine Relative Value Units (RVUs) to ensure financial stability of care teams and maintain a high value by consumers for oral health care.
- Provide education, training, and clinical technical assistance on medical or minimally invasive care and teledentistry to support clinical care associated with Domains One and Two.
- Implement pilot programs throughout a variety of care sites and networks with rigorous data collection to inform guidance on best practice approaches.
- Create and disseminate comprehensive technical assistance documentation addressing questions and concerns about implementing these domains of care, based on community feedback.
- Propose guidance and infrastructure as well as products and technology for implementing wholistic, value-based systems of care that involve dental, oral health, and other health providers working interprofessionally to promote optimal health outcomes.
- Recommend health information technology solutions that cohesively integrate medical and dental electronic health records while improving care coordination.
- Identify state and federal regulatory barriers to to the delivery of personalized and integrated services and develop intervention strategies.

Medium- and Long-Term:

- Stimulate federal, state, and private sectors to invest and lead the transformation into value-based care delivery within the domain framework.
- Provide educational guidance and instruction for schools of dentistry and dental hygiene to teach the domain framework of oral health care to future dental care teams while adopting new business models for clinical care used in education.
- Create recommendations under each domain of care for working with special populations (e.g. individuals with disabilities, older adults, rural communities, etc.).
- Develop educational platforms to train care teams and payors on the financial and billing components associated with the domain methodology.
- Create observable outcome measures and an evaluation process associated with each domain of dental care.
- Provide guidance on advancing partnerships to address community support needs and social determinants of health.

Conclusion

COVID-19 has exacerbated persistent socioeconomic disparities in health outcomes and social risk factors at a time when health agencies are anticipating less revenue and increasing pressure on social services. This new environment challenges health professionals and stakeholders to reconsider oral health care design and business operations to drive meaningful change toward improving the oral health of all. When most shelter-in-place orders were given, dentistry was separated from health care overall with different regulations, policy changes, definitions of emergency as well as routine care, and varied communication on risks and benefits. This separation reinforced the message that oral health has less value than physical health. The ramifications of undervaluing oral health undermine overall health, economics, gainful employment, mental health, school and work performance, and socialization.[259-262]

In order to reinforce the value of oral health care and its integral influence on overall health, we propose three domains of oral health investments and care advancements for financial viability and improved population health. The interventions within this domain framework can advance patient and provider well-being, while reducing the cost burdens associated with poor quality of life due to oral disease. Domains One and Two form a primary and secondary care structure in dental operations to prevent and mitigate disease advancement. This provides a streamlined approach to the integrated and personalized care model of Domain Three. The development of primary and secondary care structures within dental operations is a divergence from the "drill and fill" process. The domain approach creates a process similar to that of primary care for dental care delivery, which supplies additional guidance for implementing secondary (MIC) and tertiary (surgical) care. As seen with our medical counterparts, this system empowers patients to invest in their health. The domains reinforce connections between social and structural determinants of health, while promoting new opportunities to demonstrate value-based solutions that connect care providers, communities, and individuals.

Contributors

CareQuest Institute for Oral Health Editorial Team:

Danielle Apostolon, Mary Bayham, Dr. Sean G. Boynes†, Vuong Diep, Rebekah Fiehn, Katinka Hakuta*, Dr. Julie Frantsve-Hawley*, Christine Kanan†, Rebekah Mathews†, Caroline McLeod, Dr. Mike Monopoli, Kelli Ohrenberger*, Ilya Okunev, M. Parrish Ravelli, Trenae Simpson, Laura Skaret, Kirill Zaydenman, Madhuli Thakkar, Dr. Eric Tranby†

Publication Panel:

Gary W. Allen, DMD, MS
Vice President of Clinical Services
Advantage Dental

Matthew Allen, DDS
President
M David MI, Inc

Pamela Alston, DDS, MPP
Lead Oral Health Specialist
Humanitas, Inc.

Mary C. Backley, BA
Chief Executive Officer
Maryland Dental Action Coalition (MDAC)

Steven Barefoot, DDS
Clinical Manager for Value-based Payment
DentaQuest

Jane Barrow, MS
Associate Dean
Global and Community Health,
Executive Director,
Initiative to Integrate Oral Health and Medicine,
Lecturer, Oral Health Policy and Epidemiology
Harvard School of Dental Medicine

Kathy Bassett, RDH, MEd
Affiliate Professor
Department of Oral Health Sciences
School of Dentistry,
University of Washington

Meghan Bastin, DMD, MPH*
Pediatric Dentistry Practitioner
Dr. Stephanie Kobil, DMD, LLC

Katy Battani, RDH, MS
Project Manager, Partnership for Integrating Oral Health Care into Primary Care
National Maternal and Child Oral Health Resource Center, Georgetown University

Ann Battrell, MSDH
Chief Executive Officer
American Dental Hygiene Association

Michele Blackwell, MBA
Senior Vice President
Client Engagement Operations and Administration
DentaQuest

Robert Blashka, DDS
Dental Advisor New York / New Jersey
DentaQuest

Steven J. Brady, MBA
Regional Vice President, Southeast
Client Engagement
DentaQuest

Marcia Brand, PhD, MSDH
Senior Advisor
National Oral Health Programs
CareQuest Institute for Oral Health

Kelly A. Braun, RDH, MSDH*
Dental Delivery Systems Coordinator
Pennsylvania Office of Rural Health

Zachary Brian, DMD, MHA
Director
North Carolina Oral Health Collaborative
Foundation for Health Leadership & Innovation

Carolyn Brown, DDS, MEd
President
Carolyn Brown & Associates
Senior Clinical Advisor
CareQuest Institute for Oral Health

Yogita Butani-Thakur, DDS, MS
Chief Dental Officer
Ravenswood Family Health Network

Cass Campbell, BA, PMC
Product Manager
Septodont, Inc.

Sue Catchings, MA, CHES
Oral Health Coalition Chair
Well-Ahead Louisiana

Richard M. Celko, DMD, MBA
Chief Dental Officer
UPMC Health Plan

Jeffrey Chaffin, DDS, MPH, MBA, MHA
Vice President and Dental Director
Delta Dental of Iowa

Melinda Clark, MD*
Professor of Pediatrics
Albany Medical Center

Jami Cokley, DMD
Director of Dental Services
ReGenesis Health Care

Cara Collins, MHSc, BSBA, AAS
Senior Director, Business Development & Product Strategy
PTS Diagnostics

David Cook, CPA, MBA, CMPE
President of proMEDICIS Advisor Corporation
Consultant, Patina Solutions

Ed Coryell, DDS
Vice President, Clinical Affairs
DentaQuest

Annaliese Cothron, DHSc, MS, CPH†
Executive Director
American Institute of Dental Public Health
Senior Advisor
CareQuest Institute for Oral Health

Martha M. Dellapenna, RDH, MEd
Director
MSDA Center for Quality, Policy & Financing
Medicaid-Medicare-CHIP Services Dental Association

Mark Deutchman, MD
Professor, Department of Family Medicine
Associate Dean for Rural Health
Director, School of Medicine Rural Track Program
University of Colorado School of Medicine

Bruce Donoff, DMD, MD
Walter C. Guralnick Distinguished Professor of Oral & Maxillofacial Surgery
Harvard University Distinguished Service Professor

Burton Edelstein, DDS, MPH
Professor of Dental Medicine
(in Pediatric Dentistry)
and Health Policy and Management
Columbia University Irving Medical Center

Katie Eyes, MSW
Vice President, Program and Strategy
Blue Cross, Blue Shield of North Carolina Foundation

Christine Farrell, RDH, MPA
Oral Health Director
Michigan Department of Community Health
Adjunct Clinical Lecturer
University of Michigan

Patrick Finnerty, MPA
Senior Advisor
CareQuest Institute for Oral Health

† — Chief Editor * — Lead Editor

Jason Flores, DDS, MHA, BSN-RN
Chief of Dental Medicine
ASC Clinical Director
Associate Director AEGD Residency
University of New Mexico, Health Sciences

Mary Foley, RDH, MPH
Executive Director
Medicaid-Medicare-CHIP Services Dental Association

Margherita Fontana, DDS, PhD
Clifford Nelson Endowed Professor of Dentistry
Professor, Cariology Discipline
Co-coordinator
Department of Cariology, Restorative Sciences & Endodontics
School of Dentistry
University of Michigan

Steven P. Geiermann, DDS
Senior Manager
Access, Community Oral Health Infrastructure and Capacity
American Dental Association

Deborah George, DDS
EVP and Chief Dental Officer
Jessie Trice Community Health System, Inc

Marie D. George, MSDH
Adjunct Instructor
West Liberty University

Jane Grover, DDS, MPH
Director
Council on Advocacy for Access and Prevention
American Dental Association

Matt Guy, MPA
Lead Community Connector
Accelerated Transformation Associates

Judith Haber, PhD, APRN, BC, FAAn
The Ursula Springer Leadership Professor in Nursing
Executive Director, Oral Health Nursing Education and Practice (OHNEP)
NYU Rory Meyers College of Nursing

Kristin Haegele Hill, MS
Director of Community-Based Initiatives
Pennsylvania Chapter, American Academy of Pediatrics

Erin Hartnett, DNP, PPCNP-BC, CPNP
NYU College of Nursing
Program Director
Oral Health Nursing Education and Practice (OHNEP)
Teaching Oral-Systemic Health (TOSH)

Helen Hawkey, BSDH, PHDHP
Executive Director
Pennsylvania Coalition for Oral Health

LaVette Henderson, CMP, HMCC, FACD
Executive Director
National Dental Association

Brant Herman, BA
CEO and Founder
Mouthwatch, LLC.

Angela Hileman, BS
Manager, Business Development
PTS Diagnostics

Taylor Horne, BSBA
Dental Program Administrator
CareSouth Carolina

Jeremy Horst, DDS, PhD
Director, Clinical Innovation,
CareQuest Innovation Partners
Affiliate Instructor, University of Washington
Department of Oral Health Sciences
Pediatric Dentist, Sonoma County, Californmia

Debony Hughes, DDS
Director, Office of Oral Health
Maryland Department of Health
Prevention and Health Promotion Administration

Tracy Hurley, MS, JD
Vice President,
Benefit Data and Credentialing
DentaQuest

Matt Jacob, BA
Public Health Communications Consultant
Jacob Strategies, LLC

Brian Jones, MA
Vice President, Capture and Business Development
DentaQuest

Christine B. Kavanagh, DNP (c), RD, PPCNP-BC
Medical Provider
River Valley Health & Dental Center

C. Eve J. Kimball, MD
PC Project Advisor, Healthy Teeth, Healthy Children
Pennsylvania Chapter, American Academy of Pediatrics

Mark Koday, DDS
Program Director
Northwest Dental Residency, AEGD

David Krol, MD, MPH*
Vice President for Health Initiatives
Child Health and Development Institute
Medical Director
Connecticut Children's Care Network

Susan Lawson, MHR
Director of Oral Health Services
Ohio Association of Community Health Centers

Huong Le, DDS, MA
Chief Dental Officer
Asian Health Services

Elizabeth Leonin, BS
Senior Vice President, Analytics and Underwriting
DentaQuest

Bruce Lieberthal, DDS
Chief Innovation Officer
Henry Schein, Inc.
Board of Directors
The Forsyth Institute

Stefan Listl, DDS, PhD
Professor in Quality and Safety of Oral Health Care
Radboud University – Radboudumc (RIHS),
Department of Dentistry, The Netherlands
Director of Section for Translational Health Economics
Heidelberg University – Medical Faculty,
Department of Conservative Dentistry, Germany

Karl Lyons, MDS, PhD, FRACDS
Professor and Chair in Restorative Dentistry
Department of Oral Rehabilitation
Faculty of Dentistry
University of Otago, New Zealand

Dominikus A. Lysek, PhD, MChem
CEO & Founder
credentis ag, Switzerland

Jill Malmgren, BS
Executive Director
America's Toothfairy
National Children's Oral Health Foundation

Douglas T. Manning DMD, JD, MPH
Florida Dental Director
DentaQuest

Thomas M. Mattingly, MBA
Senior Vice President, Provider Networks
CareSource

Amy B. Martin, DrPH, MSPH*
Professor and Chair,
Department of Stomatology
James B. Edwards College of Dental Medicine
Medical University of South Carolina

Katya Mauritson, DMD
Colorado State Dental Director
Colorado Department of Public Health and Environment

Elizabeth A. Mertz, PhD, MA
Professor, Preventive & Restorative Dental Sciences
University of California, San Francisco

Ernest Meshack-Hart, DDS
Dental Director
Terry Reilly Health Services

Felisha Mickens, RDH, BS
Itinerant Oral Health Hygienist

Donna Mills, BS
Executive Director
Central Oregon Health Council

Billy Milwee, MHA
President & CEO
Millwee & Associates, LLC

Paul Mondock, MBA
President, Americas
Septodont, Inc.

Heath Montgomery, DMD
Heath Montgomery, DMD
Family and Cosmetic Dentistry
Oral and Moderate IV Sedation

Marla Morse, MPA, MSW
Program Director
Oral Health Ohio

Joe Mountain, DMD
Director of Dental Operations – West
Family First Health

LaJuan Mountain, DMD
Director of Dental Operations – East
Family First Health

Mana Mozaffarian, DMD
Chief Dental Officer
Pennsylvania Department of Health
Pennsylvania Department of Human Services

Nader A. Nadershahi, DDS, MBA, EdD
Dean
University of the Pacific
Arthur A. Dugoni School of Dentistry
Member: Santa Fe Group

Amanda Norton, MSW
Quality Improvement Advisor
A. Mandatory, Inc.

An Nguyen, DDS, MPH
Chief Dental Officer
Clinica Family Health

Anthony Palatta, DDS, EdD
Chief Learning Officer
American Dental Education Association

Da-Nell Pedersen, MPA
Director of Clinical Programs
Arizona Alliance for Community Health Centers

Francisco Ramos-Gomez, DDS, MS, MPH
Professor
Director of UCLA Center for Children's Oral Health (UCCOH)
Director of UCLA Pediatric Dentistry Advanced Clinical Training Program (ACT)

Vanessa Rastovic, Esq.
Policy Manager, Disability Healthcare Initiative
Achieva

Amah Riley, BA, RDH
Technical Assistance Coach
Division of Population Oral Health
James B. Edwards College of Dental Medicine
Medical University of South Carolina

Angela Rinchuse, RDH, BS, M Ed
Professor and Program Director for Dental Hygiene
Westmoreland County Community College

Diane D. Romaine, DMD, MScM, MAGD
General Dentistry Practitioner
Dr. Diane D. Romaine & Associates
President
Maryland State Dental Association Foundation

Bob Russell, DDS, MPH, MPA, CPM*
Senior Advisor
CareQuest Institute for Oral Health
Dental Director & Bureau Chief
Oral & Health Delivery System Bureau
Division of Health Promotion and Chronic Disease Prevention
Iowa Department of Public Health

Ankit Sanghavi, BDS MPH
Executive Director
Texas Health Institute

Thomas D. Schwieterman, MD
Vice President of Clinical Affairs and Chief Medical Officer
Midmark Corporation

Savyasachi Shah, BDS, MPH
Research Scientist, Health Care Evaluation
NORC at the University of Chicago

Wenyuan Shi, PhD
Chief Executive Officer
Chief Scientific Officer
The Forsyth Institute

Hugh Silk, MD, MPH
Professor – Department of Family Medicine & Community Health –
UMass Medical School
Harvard School of Dental Medicine –
Part-time Lecturer
Co-PI – CIPCOH – Center for Integration of Primary Care and Oral Health

Richard A. Simpson, DMD
Pediatric Dentistry Practitioner
Children and Teen Dental Alabama
State Dental Liaison, Alabama Chapter – AAP
Immediate Past Chair, Oral Health Coalition of Alabama
Advisory Board Member, The Teledentists

Janet Southerland, DDS, MPH, PhD
Professor & Vice President of Interprofessional Education
Institutional Effectiveness, and the Health Education Center
University of Texas Medical Branch at Galveston

Heiko Spallek, PhD, DMD, MSBA
Professor, Head of School and Dean
The University of Sydney School of Dentistry
Sydney, Australia

Tena Springer, RDH, MA
Dental Division Administrator
Family Health Center of Marshfield, Inc.

Linda Straub-Bruce, RDH, BSEd, PHDHP
Practice Manager
Hammerlee Dental Care
President
Pennsylvania Dental Hygienists' Association

Olivia Straub, MPP
Data Scientist
Office of Oral Health
Maryland Department of Health
Prevention and Health Promotion Administration

Gregory A. Stoute, DMD, MPH
Texas Quality and Compliance Program
DentaQuest

Nathan Suter, DDS
Chief Executive Officer
Access Teledentistry
Co-founder
Healier

James E. Thommes, DDS
Vice President Clinical Management
DentaQuest

Tamanna Tiwari, MPH, MDS, BDS
Assistant Professor
Department of Community Dentistry and Population Health
University of Colorado School of Dental Medicine

Sherie L Tynes, CDA, RDH, ,PHDHP, MSEd
Associate Professor-Dental Hygiene
Dental Hygiene CE Coordinator
HACC, Central Pennsylvania's Community College

Christine Veschusio, DrPH, RDH*
Affiliate Assistant Professor
James B. Edwards College of Dental Medicine
Medical University of South Carolina

Linda Vidone, DMD
Vice President Clinical Management
Senior Dental Director
Delta Dental of Massachusetts

Stacy Warren, MEd
Program Officer, Healthcare
The Duke Endowment

Robert J. Weyant, DMD, DrPH
Professor and Chair
Department of Dental Public Health
University of Pittsburgh School of Dental Medicine

Cory B. White, DMD
Lead Dentist
Sarrell Dental, Dothan

Josefine Ortiz Wolfe, PhD, RDH, CHES
Chair, Oral Health Section
American Public Health Association
Assistant Professor, College of Graduate Health Studies
A.T. Still University

Mark S. Wolff, DDS, PhD
Morton Amsterdam Dean
Professor, Division of Restorative Dentistry
University of Pennsylvania School of Dental Medicine

Christine Wood, RDH, BS
Executive Director
Association of State and Territorial Dental Directors

Hsiu Mei Wong, BSBA
Member of PA's Management Group
PA Consulting Group

Vicki M. Young, PhD
Chief Operating Officer
South Carolina Primary Health Care Association

References

1. Brouch A, Keilhacker K, Blanchard D. Leading beyond the blizzard: why every organization is now a start-up. The Praxis Journal. Mar 2020. Available at: https://journal.praxislabs.org/leading-beyond-the-blizzard-why-every-organization-is-now-a-startup-b7f32fb278ff?gi=c3d500899ff9. Accessed: May 5, 2020.

2. Rebhan A. COVID-19 is a black swan for digital health start-ups. Available at: https://www.advisory.com/research/health-care-it-advisor/it-forefront/2020/04/covid-19-black-swan. Accessed: May 5, 2020.

3. Spear S. We're all start-ups now. MIT Management Executive Education. Innovation @ work webinar series. Available at: https://mit.zoom.us/webinar/register/1815882566096/WN_xFFcZA96QmKPPj60-R4Anw. Accessed: May 5, 2020.

4. Creaco E, Franchini M, Walski TM. Comparison of various phased approaches for the constrained minimum-cost design of water distribution networks. Urban Water Journal. 2016 Apr 2;13(3):270-83.

5. Beck, J.D., et al., Periodontal profile class is associated with prevalent diabetes, coronary heart disease, stroke, and systemic markers of C-reactive protein and interleukin-6. J Periodontol, 2018. 89(2): p. 157-165.

6. Woelber, J.P., et al., Erratum to: An oral health optimized diet can reduce gingival and periodontal inflammation in humans — a randomized controlled pilot study. BMC Oral Health, 2016. 16(1): p. 109.

7. Scannapieco FA. The oral microbiome: its role in health and in oral and systemic infections. Clinical Microbiology Newsletter. 2013 Oct 15;35(20):163-9.

8. Boynes, S.G., et al., Narrowing the rural oral healthcare gap: the 2017 rural interprofessional oral health practice symposium. BMC Oral Health, 2018. 18(Suppl 1): p. 212.

9. American Dental Association. Embedding dental benefits in medical plans is on the way. ADA News. Available at: https://www.ada.org/en/publications/ada-news/2018-archive/january/survey-embedding-dental-benefits-in-medical-plans-is-on-the-way Accessed: April 30, 2020.

10. Institute of Medicine. Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. National Academies Press. 2001.

11. Birch S, Listl S. The economics of oral health and health care. Max Planck Institute for Social Law and Social Policy Discussion Paper. 2015 May 20(07-2015).

12. Listl, S., Value-Based Oral Health Care: Moving Forward With Dental Patient-Reported Outcomes. J Evid Based Dent Pract, 2019. 19(3): p. 255-259.

13. Foley M, Singer J, Eliason S. Oral Health and Value Based Care: Connecting the Dots. National Conference of State Legislatures. Available at: https://www.ncsl.org/research/health/oral-health-and-value-based-care-connecting-the-dots.aspx. Accessed: April 24, 2020.

14. Vujicic, M., T. Buchmueller, and R. Klein, Dental Care Presents The Highest Level Of Financial Barriers, Compared To Other Types Of Health Care Services. Health Aff (Millwood), 2016. 35(12): p. 2176-2182

15. Boynes SG, Brown C, Tranby EP. Exploring alternative payment models for oral health care. Dec Dent. 2020; 6(1):30-35.

16. Vujicic, M., Our dental care system is stuck: And here is what to do about it. J Am Dent Assoc, 2018. 149(3): p. 167-169.

17. Halfon, N., et al., Applying a 3.0 transformation framework to guide large-scale health system reform. Health Aff (Millwood), 2014. 33(11): p. 2003-11.

18. DentaQuest. Reversible decay: oral health is a public health problem we can solve. Available at: http://www.dentaquest.com/pdfs/reports/reversible-decay.pdf/. Accessed: April 30, 2020.

19. Farran H. Accepting Medicare isn't going to help your practice succeed. Dentaltown. April, 2020.

20. Simmons G. Making care a business. Faculty Dental Journal. 2018 Jul;9(3):122-3.

21. American Dental Association. Breaking down barriers to oral health for all Americans: the role of finance. Available at: http://www.ada.org/~/media/ADA/Public%20Programs/Files/barriers-paper_role-of-finance.ashx. Accessed: April 30,2020.

22. Fialkoff S. The big swerve. Inside Dentistry. 2018; 14(9):12-14.

23. Henshaw, M.M., R.I. Garcia, and J.A. Weintraub, Oral Health Disparities Across the Life Span. Dent Clin North Am, 2018. 62(2): p. 177-193.

24. Hupp, J.R., Dental Care for the Working Poor-We Need Answers. J Oral Maxillofac Surg, 2017. 75(10): p. 2033-2035.

25. Como, D.H., et al., The Persistence of Oral Health Disparities for African American Children: A Scoping Review. Int J Environ Res Public Health, 2019. 16(5).

26. P & R Dental Strategies. Commerical dental market impact analysis through Q2 2020. Available at: https://www.pandrdental.com/eoti-20200421-comm-dental-market-impact/. Accessed: May 2, 2020.

27. Fontana J, Murawski T. COVID-19: Impact to dental utilization. Milliman White Paper. Available at: https://us.milliman.com/en/insight/COVID-19-Impact-to-dental-utilization. Accessed: May 2, 2020.

28. American Dental Association Health Policy Institute. The economic impact of COVID 19 on dentistry: Where are we heading? Available at: https://www.youtube.com/watch?v=mbYUtKcSaHI. Accessed: May 2, 2020.

29. American Dental Association Health Policy Institute. COVID-19's impact on the dental care sector. Available at: https://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIbrief_0420_1.pdf?la=en. Accessed: May 5, 2020.

30. Gruber J, Sommers BD. Paying for Medicaid—state budgets and the case for expansion in the time of coronavirus. New England Journal of Medicine. 2020 Mar 31.

31. Casamassimo PS, Townsend JA, Litch CS. Pediatric Dentistry During and After COVID-19. Pediatric Dentistry. 2020 Mar 15;42(2):87-90.

32. American Dental Association Health Policy Institute. COVID-19 recovery slowing. ADA News. Available at: https://www.ada.org/en/publications/ada-news/2020-archive/july/eighth-wave-of-hpi-poll-shows-dental-care-rebound-slowing-down Accessed: July 26, 2020.

33. Rubin MS, Edelstein BL. Perspectives on evolving dental care payment and delivery models. The Journal of the American Dental Association. 2016 Jan 1;147(1):50-6.

34. Riley, W., M. Doherty, and K. Love, A framework for oral health care value-based payment approaches. J Am Dent Assoc, 2019. 150(3): p. 178-185

35. Collins RJ, Friedman JW. The future of payment for dental care. Current Oral Health Reports. 2018 Sep 1;5(3):147-53.

36. Edelstein BL. A public health perspective on paying for dentistry, the Affordable Care Act, and looking to the future. Dental Clinics. 2018 Apr 1;62(2):327-40.

37. Edelstein, B.L., A Public Health Perspective on Paying for Dentistry, the Affordable Care Act, and Looking to the Future. Dent Clin North Am, 2018. 62(2): p. 327-340.

38. Wong CA, Perrin JM, McClellan M. Making the case for value-based payment reform in children's health care. JAMA Pediatr. 2018;172:513-514.

39. Adams, J.G. and R.M. Walls, Supporting the Health Care Workforce During the COVID-19 Global Epidemic. JAMA, 2020. 323(15): p. 1439-1440.

40. Gold SB, Green LA, Westfall JM. How Payment Reform Could Enable Primary Care to Respond to COVID-19. Available at: https://www.milbank.org/wp-content/uploads/2020/04/IssueBrief_COVID_PRIMARYCARE_4.pdf Accessed: May 4, 2020.

41. Ahern, S., et al., Needs-based planning for the oral health workforce—development and application of a simulation model. Hum Resour Health, 2019. 17(1): p. 55.

42. Birch S, Kephart G, Tomblin-Murphy G, O'Brien-Pallas L, Alder R, MacKenzie A. Human resources planning and the production of health: a needs-based analytical framework. Canadian Public Policy. 2007;33(Supplement 1):S1–S16.

43. Mukherjee D, D'Souza D. Think phased implementation for successful data warehousing. Information Systems Management. 2003 Mar 1;20(2):82-90.

44. Lyneis JM. System dynamics for business strategy: a phased approach. System Dynamics Review: The Journal of the System Dynamics Society. 1999 Mar;15(1):37-70.

45. Chompu-Inwai R, Tipgunta S, Sunawan A. Implementation of total productive maintenance in healthcare: A pilot study. In2008 international conference on service systems and service management 2008 Jun 30 (pp. 1-6). IEEE.

46. Health Care Payment Learning and Action Network. Alternative Payment Model (APM) Framework White Paper. Available at: https://hcp-lan.org/apm-refresh-white-paper/. Accessed: May 2, 2020.

47. American Dental Association News. In-office membership plans could build patient loyalty, revenue. Available at: https://www.ada.org/en/publications/ada-news/2018-archive/june/in-office-membership-plans-could-build-patient-loyalty-revenue. Accessed: May 2, 2020.

48. Waddill K. Payer extends value based contracting to dental provider group. Health Payer Intelligence. Available at: https://healthpayerintelligence.com/news/payer-extends-value-based-contracting-to-dental-provider-group. Accessed: May 4, 2020.

49. Castellucci, Maria (2020). COVID-19: The Swan Song of ACOS, More than Half of Risk-Bearing ACOS may leave Medicare Shared Savings Program. https://pnhp.org/news/covid-19-the-swan-song-of-acos/

50. Herman, Bob. (2020). The Coronavirus could force more doctors to sell — or shutter. https://www.axios.com/coronavirus-doctors-practices-sell-close-d59aa9f0-1e01-4a90-82f7-d4ebab26e355.html

51. Artiga S, Hinton E. Beyond health care: the role of social determinants in promoting health and health equity. Washington DC: Henry J Kaiser Family Foundation; 2018.

52. Schroeder S. We can do better — improving the health of the American people. N Engl J Med. 2007;357:7.

53. Braveman P, Gottlieb L. The social determinants of health: it's time to consider the causes of the causes. Public Health Reports. 2014;129:12

54. Marmot M, Friel S, Bell R, Houweling TA, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health. The Lancet 2008;372(9650):6.

55. Langelier M, Rodat C, Moore J. Case studies of 6 teledentistry programs: strategies to increase access to general and specialty dental services. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies School of Public Health, SUNY Albany; December, 2016.

56. Minnesota Department of Human Services. Legislative Report. Recommendations for improving oral health services delivery system. Available at: https://www.leg.state.mn.us/docs/2014/mandated/140261.pdf. Accessed: July 26, 2020.

57. McGinnis, J.M., P. Williams-Russo, and J.R. Knickman, The case for more active policy attention to health promotion. Health Aff (Millwood), 2002. 21(2): p. 78-93.

58. Albino J, Tiwari T. Behavior Change for Caries Prevention: Understanding Inconsistent Results. JDR Clin Trans Res 2020;5(1):6-9.

59. Johnson, B.R., et al., A chairside aid for shared decision making in dentistry: a randomized controlled trial. J Dent Educ, 2006. 70(2): p. 133-41.

60. Grocott MP, Plumb JO, Edwards M, Fecher-Jones I, Levett DZ. Re-designing the pathway to surgery: better care and added value. Perioperative Medicine. 2017 Dec;6(1):9.

61. Project Echo. The HHS Telemedicine Hack. Available at: https://echo.unm.edu/. Accessed: July 26, 2020.

62. Enlund S, Skinner E. Teledentistry: Connecting rural communities to dental care. National Conference of State Legislatures. Available at: https://www.ncsl.org/blog/2020/03/04/teledentistry-connecting-rural-communities-to-dental-care.aspx#:~:text=Twenty%20states%20have%20adopted%20reimbursement,and%2For%20private%20payer%20policies. Accessed: July 26, 2020.

63. Fiehn R, Okunev I, Bayham M, Barefoot S, Tranby EP. Emergency and Urgent Dental Visits Among Medicaid Enrollees from 2013 to 2017. Research Square; 2020. DOI: 10.21203/rs.3.rs-28431/v1

64. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. The milbank quarterly. 2005 Sep;83(3):457-502.

65. Chang CH, Stukel TA, Flood AB, Goodman DC. Primary care physician workforce and Medicare beneficiaries' health outcomes. Jama. 2011 May 25;305(20):2096-104.

66. Fricton, J. and H. Chen, Using teledentistry to improve access to dental care for the underserved. Dent Clin North Am, 2009. 53(3): p. 537-48.

67. Friedman, J.W., D.A. Nash, and K.R. Mathu-Muju, The virtual dental home: a critique. J Public Health Dent, 2017. 77(4): p. 302-307.

68. Böhm da Costa C, da Silva Peralta F, and Lúcia Schaefer A, de Mello F. Telemedicine and e-Health.Jul 2020.945-954. http://doi.org/10.1089/tmj.2019.0122

69. Glassman P, Harrington M, Mertz E, Namakian M. The virtual dental home: implications for policy and strategy. J Calif Dent Assoc. 2012;40(7):605-611.

70. Namakian M, Subar P, Glassman P, Quade R, Harrington M. In-person versus "virtual" dental examination: congruence between decision-making modalities. J Calif Dent Assoc. 2012;40(7):587-595.

71. Federal Communications Commission. Eighth broadband progress report. FCC. Available at: https://www.fcc.gov/reports-research/reports/broadband-progress-reports/eighth-broadband-progress-report. Accessed: July 16, 2020.

72. DentaQuest Partnership. Teledentistry in Practice. Available at: https://www.dentaquestpartnership.org/care-improvement/teledentistry-in-practice. Accessed: September 7, 2020.

73. Glassman P. Improving oral health using telehealth-connected teams and the virtual dental home system of care: Program and policy considerations. DentaQuest Partnership for Oral Health Advancement, 2019.

74. Cunha-Cruz, J., et al., "Everybody brush!": protocol for a parallel-group randomized controlled trial of a family-focused primary prevention program with distribution of oral hygiene products and education to increase frequency of toothbrushing. JMIR Res Protoc, 2015. 4(2): p. e58.

75. Rowland, S., et al., Impact of a Community Dental Access Program on Emergency Dental Admissions in Rural Maryland. Am J Public Health, 2016. 106(12): p. 2165-2170.

76. Kay, E., et al., A review of approaches for dental practice teams for promoting oral health. Community Dent Oral Epidemiol, Community dentistry and oral epidemiology, 44(4), pp.313-330.

77. Hayes, M.J., et al., Dietary analysis and nutritional counselling for caries prevention in dental practise: a pilot study. Aust Dent J, 2017. 62(4): p. 485-492.

78. Martin J, Mills S, Foley ME. Innovative models of dental care delivery and coverage: patient-centric dental benefits based on digital oral health risk assessment. Dental Clinics. 2018 Apr 1;62(2):319-25.

79. Greenberg, B.L., et al., Dentists' attitudes toward chairside screening for medical conditions. J Am Dent Assoc, 2010. 141(1): p. 52-62.

80. Guzmán-Armstrong, S., et al., Dental Caries: Evidence and Interdisciplinary Person-Centered Care Considerations for Management Over Time. Dent Clin North Am, 2019. 63(4): p. xiii-xv.

81. Harnagea H, Couturier Y, Shrivastava R, Girard F, Lamothe L, Bedos CP, Emami E. Barriers and facilitators in the integration of oral health into primary care: a scoping review. BMJ open. 2017 Sep 1;7(9).

82. Garcia, R.I., R. Compton, and T. Dietrich, Risk assessment and periodontal prevention in primary care. Periodontol 2000, 2016. 71(1): p. 10-21.

83. Mullins, J.M., J.B. Even, and J.M. White, Periodontal Management by Risk Assessment: A Pragmatic Approach. J Evid Based Dent Pract, 2016. 16 Suppl: p. 91-8.

84. Pine, C.M., et al., Dental RECUR Randomized Trial to Prevent Caries Recurrence in Children. J Dent Res, 2020. 99(2): p. 168-174.

85. Kilian, M., et al., The oral microbiome - an update for oral healthcare professionals. Br Dent J, 2016. 221(10): p. 657-666.

86. Gomez A, Nelson KE. The oral microbiome of children: development, disease and implications beyond oral health. Microb Ecol. 2017; 73:492-503.

87. Boynes SG, Novy BB, Peltier C. Risk-based treatment planning. Decision in Dentistry. Available at: https://decisionsindentistry.com/article/risk-based-treatment-planning/. Accessed May 15, 2020.

88. Kim, K.S., et al., Interactive toothbrushing education by a smart toothbrush system via 3D visualization. Comput Methods Programs Biomed, 2009. 96(2): p. 125-32.

89. Xu K, Wang X, Wei W, Song H, Mao B. Toward software defined smart home. IEEE Communications Magazine. 2016 May 18;54(5):116-22.

90. Thapliyal H, Nath RK, Mohanty SP. 2017: Solutions to improve care and quality of life. IEEE Consumer Electronics Magazine. 2017 Dec 13;7(1):68-76.

91. Adam, R., Introducing the Oral-B iO electric toothbrush: next generation oscillating-rotating technology. Int Dent J, 2020. 70 Suppl 1: p. S1-S6.

92. Roblek V, Mesko M, Dimovski V, Peterlin J. Smart technologies as social innovation and complex social issues of the Z generation. Kybernetes. 2019 Jan 14.

93. DentaQuest Partnership for Oral Health Advancement. June 2020. Patients Give High Marks to Their Teledentistry Experience. Boston, MA. https://www.dentaquestpartnership.org/system/files/DQP_Teledentistry_Survey_Communications_Brief_0.pdf. DOI:10.35565/DQP.2020.2012.

94. Irving, M., et al., Using teledentistry in clinical practice as an enabler to improve access to clinical care: A qualitative systematic review. J Telemed Telecare, 2018. 24(3): p. 129-146.

95. Bodenheimer, T. and C. Sinsky, From triple to quadruple aim: care of the patient requires care of the provider. Ann Fam Med, 2014. 12(6): p. 573-6.

96. Pereira LJ, Pereira CV, Murata RM, Pardi V, Pereira-Dourado SM. Biological and social aspects of Coronavirus Disease 2019 (COVID-19) related to oral health. Brazilian Oral Research. 2020;34.

97. Ahmed, M.A., et al., Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak. Int J Environ Res Public Health, 2020. 17(8).

98. Maret, D., et al., Integration of telemedicine into the public health response to COVID-19 must include dentists. Int Endod J, 2020. 53(6): p. 880-881.

99. Institute of Medicine. Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. National Academies Press. 2001.

100. Muzammil S. Telehealth: Is It Only for the Rural Areas? A Review of Its Wider Use. Telehealth and Medicine Today. 2020 Jan 30;5:10-30953.

101. DentaQuest Partnership for Oral Health Advancement. March 2020. Fast-Track to Teledentistry: Removing Barriers to Care While Maximizing Overall Health. Boston, MA. DOI:10.35565/DQP.2020.2010

102. Maret, D, Peters, OA, Vaysse, F, Vigarios, E. Integration of telemedicine into the public health response to COVID-19 must include dentists. International Endodontic Journal, 53, 880– 881, 2020.

103. Pew Research Center. Mobile Fact Sheet. Available at: https://www.pewresearch.org/internet/fact-sheet/mobile/ Accessed: July 19, 2020.

104. Smith A. U.S. smartphone use. Pew Research Center. Available at: https://www.pewresearch.org/internet/2015/04/01/us-smartphone-use-in-2015/ Accessed July 19, 2020.

105. Brennen, J.S., A.J. Lazard, and E.T. Adams, Multimodal mental models: Understanding users' design expectations for mHealth apps. Health Informatics J, 2020. 26(3): p. 1493-1506.

106. Howell S, Burkholder W, Hughes L, Cottam W. Teledentistry and Interprofessional Care: Oral Health Within a Medical Clinic. Pediatrics July 2020, 146 (1 MeetingAbstract) 394; DOI: https://doi.org/10.1542/peds.146.1_MeetingAbstract.394.

107. Braun, P.A. and A. Cusick, Collaboration Between Medical Providers and Dental Hygienists in Pediatric Health Care. J Evid Based Dent Pract, 2016. 16 Suppl: p. 59-67.

108. Silk, H., The Future of Oral Health Care Provided by Physicians and Allied Professionals. J Dent Educ, 2017. 81(8): p. eS171-eS179.

109. Hollander JE, Carr BG. Virtually perfect? Telemedicine for COVID-19. New England Journal of Medicine. 2020 Mar 11. Available at: https://www.nejm.org/doi/full/10.1056/NEJMp2003539. Accessed: May, 15, 2020.

110. Lamont, T., et al., Routine scale and polish for periodontal health in adults. Cochrane Database Syst Rev, 2018. 12: p. CD004625.

111. Summary of ADA Guidance During the COVID-19 Crisis. American Dental Association; 2020. ADA publication 1-2.

112. Centers for Disease Control and Prevention. Interim Infection Prevention and Control Guidance for Dental Settings During the COVID-19 Response; 2020. "https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html" Assessed. Apr. 10, 2020.

113. Implementation of Mitigation Strategies for Communities with Local COVID-19 Transmission. Centers for Disease Control and Prevention; 2020. CDC publication 1-10.

114. Müller P, Heimlinger R, Lukic A, Zumstein T, Bommer C. Evaluation of a tooth gel with Curolox®-Technology as part of professional tooth-cleaning, with regards to patient satisfaction and the effects of hypersensitivity. Available at: https://www.credentis.com/wp-content/uploads/2017/04/Mueller2013-1.pdf. Accessed: October 15, 2020.

115. Milgrom, P., et al., Topical silver diamine fluoride for dental caries arrest in preschool children: A randomized controlled trial and microbiological analysis of caries associated microbes and resistance gene expression. J Dent, 2018. 68: p. 72-78.

116. Mickenautsch, S., et al., Absence of carious lesions at margins of glass-ionomer and amalgam restorations: a meta-analysis. Eur J Paediatr Dent, 2009. 10(1): p. 41-6.

117. Alsabek, L., et al., Retention and remineralization effect of moisture tolerant resin-based sealant and glass ionomer sealant on non-cavitated pit and fissure caries: Randomized controlled clinical trial. J Dent, 2019. 86: p. 69-74.

118. Horst JA, Ellenikiotis H, Milgrom PM, UCSF Silver Caries Arrest Committee. UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications, and consent. Journal of the California Dental Association. 2016 Jan;44(1):16.

119. Ebrahimi, M., et al., The effects of three remineralizing agents on regression of white spot lesions in children: A two-week, single-blind, randomized clinical trial. J Clin Exp Dent, 2017. 9(5): p. e641-e648.

120. Carroll J, Notgarnie HM. Nonsurgical attachment gain: A protocol for achieving periodontal reattachment. Available at: https://www.rdhmag.com/patient-care/article/16409275/nonsurgical-attachment-gain-a-protocol-for-achieving-periodontal-reattachment. Accessed: June 7, 2020.

121. Slayton, R.L., et al., Evidence-based clinical practice guideline on nonrestorative treatments for carious lesions: A report from the American Dental Association. J Am Dent Assoc, 2018. 149(10): p. 837-849.e19.

122. DentaQuest Ventures. What does value based care mean? Available at: https://whatsnew.dentaquest.com/what-is-value-based-care-what-does-it-mean-for-oral-health-care/. Accessed: September 7, 2020.

123. DentaQuest Ventures.Value based care. Available at: https://dentaquest.com/oral-health-resources/the-future-of-oral-health/value-based-care/. Accessed: September 7, 2020.

124. Health Informatics Online Masters. A shift to value-based healthcare. Available at: https://healthinformatics.uic.edu/blog/shift-from-volume-based-care-to-value-based-care/. Accessed: September 7, 2020.

125. Van der Nat PB, Van Veghel D, Daeter E, Crijns HJ, Koolen J, Houterman S, Soliman MA, de Mol BA, Meetbaar Beter Study Group. Insights on value-based healthcare implementation from Dutch heart care. International Journal of Healthcare Management. 2020 Jul 2;13(3):189-92.

126. Conrad DA, Milgrom P, Shirtcliff RM, Balit HL, Ludwig S, Dysert J, Allen G, Cunha-Cruz J. Pay-for-performance incentive program in a large dental group practice. J Am Dent Assoc. 2018; 149(5):348-52.

127. American Academy of Pediatric Dentistry. Sealant polices and guidelines. Available at: https://www.aapd.org/media/Policies_Guidlies/G_Sealants.pdf/ Accessed: July 26, 2020.

128. Chi, D.L., D.N. van der Goes, and J.P. Ney, Cost-effectiveness of pit-and-fissure sealants on primary molars in Medicaid-enrolled children. Am J Public Health, 2014. 104(3): p. 555-61.

129. Center for Disease Control. Untreated dental caries. Available at: https://www.cdc.gov/nchs/data/hus/2018/028.pdf. Accessed: June 24, 2020

130. Gao, S.S., et al., Clinical Trials of Silver Diamine Fluoride in Arresting Caries among Children: A Systematic Review. JDR Clin Trans Res, 2016. 1(3): p. 201-210.

131. American Academy of Pediatric Dentistry. SDF policies and guidelines. Available at: https://www.aapd.org/media/Policies_Guidelines/G_SDF.pdf. Accessed: July 26, 2020.

132. Dos Santos, V.E., et al., Paradigm shift in the effective treatment of caries in schoolchildren at risk. Int Dent J, 2012. 62(1): p. 47-51

133. Eke, P.I., et al., Periodontitis in US Adults: National Health and Nutrition Examination Survey 2009-2014. J Am Dent Assoc, 2018. 149(7): p. 576-588.e6

134. Newton, J.T. and K. Asimakopoulou, Minimally invasive dentistry: Enhancing oral health related behaviour through behaviour change techniques. Br Dent J, 2017.

135. Rayapudi J, Usha C. Knowledge, attitude and skills of dental practitioners of Puducherry on minimally invasive care concepts: A questionnaire survey. Journal of conservative dentistry: JCD. 2018 May;21(3):257.

136. Mount GJ. Minimal intervention dentistry: Cavity classification preparation. J Minimal Interv Dent. 2009;2:150–62.

137. Gordan, V.V., et al., A long-term evaluation of alternative treatments to replacement of resin-based composite restorations: results of a seven-year study. J Am Dent Assoc, 2009. 140(12): p. 1476-84.

138. Gordan, V.V., E. Mondragon, and C. Shen, Replacement of resin-based composite: evaluation of cavity design, cavity depth, and shade matching. Quintessence Int, 2002. 33(4): p. 273-8.

139. Gordan, V.V., Clinical evaluation of replacement of class V resin based composite restorations. J Dent, 2001. 29(7): p. 485-8.

140. Brantley CF, Bader JD, Shugars DA, Nesbit SP. Does the cycle of re-restoration lead to larger restorations? J Am Dent Assoc. 1995;126(10):1407–13.

141. Rayapudi, J. and C. Usha, Knowledge, attitude and skills of dental practitioners of Puducherry on minimally invasive dentistry concepts: A questionnaire survey. J Conserv Dent, 2018. 21(3): p. 257-262.

142. Featherstone, J.D. and S. Doméjean, Minimal intervention dentistry: part 1. From 'compulsive' restorative dentistry to rational therapeutic strategies. Br Dent J, 2012. 213(9): p. 441-5.

143. da Mata, C., et al., Subjective impact of minimally invasive dentistry in the oral health of older patients. Clin Oral Investig, 2015. 19(3): p. 681-7.

144. Lakshmi SP, DEEPIKA M, SAHANA S, VASA AA, MADU GP, BEZAWADA S. Atraumatic Restorative Treatment vs. Hall Technique for Occlusoproximal Lesions in Primary Dentition-An In vivo Study. Journal of Clinical & Diagnostic Research. 2018 Feb 1;12(2).

145. Crystal, Y.O., et al., Parental perceptions and acceptance of silver diamine fluoride staining. J Am Dent Assoc, 2017. 148(7): p. 510-518.e4

146. Basso M, Brambilla E, Benites MG, Giovannardi M, Ionescu AC. Glass ionomer cement for permanent dental restorations: a 48 month, multi-centre prospective clinical trial. Stoma Edu J. 2015;2(1):25-35.

147. Wright, C.D., et al., Periodontal Status and Quality of Life: Impact of Fear of Pain and Dental Fear. Pain Res Manag, 2017. 2017: p. 5491923.

148. McNeil DW, Au AR, Zvolensky MJ, McKee DR, Klineberg IJ, Ho CC. Fear of pain in orofacial pain patients. Pain. 2001 Jan 1;89(2-3):245-52.

149. Gordon SM, Dionne RA, Snyder J. Dental fear and anxiety as a barrier to accessing oral health care among patients with special health care needs. Special care in dentistry. 1998 Mar;18(2):88-92.

150. Sokolowski, C.J., J.A. Giovannitti, and S.G. Boynes, Needle phobia: etiology, adverse consequences, and patient management. Dent Clin North Am, 2010. 54(4): p. 731-44.

151. Ramos-Gomez F. Evidence-based ECC prevention, intervention and management strategies. J Mich Dent Assoc. July 2020; 58-65.

152. Forsten, L., Fluoride release and uptake by glass-ionomers and related materials and its clinical effect. Biomaterials, 1998. 19(6): p. 503-8.

153. Al-Halabi, M., et al., Assessment of paediatric dental guidelines and caries management alternatives in the post COVID-19 period. A critical review and clinical recommendations. Eur Arch Paediatr Dent, 2020. 21(5): p. 543-556.

154. Featherstone, J.D., M. Fontana, and M. Wolff, Novel Anticaries and Remineralization Agents: Future Research Needs. J Dent Res, 2018. 97(2): p. 125-127.

155. Urquhart, O., et al., Nonrestorative Treatments for Caries: Systematic Review and Network Meta-analysis. J Dent Res, 2019. 98(1): p. 14-26.

156. Tedesco, T.K., et al., ART is an alternative for restoring occlusoproximal cavities in primary teeth - evidence from an updated systematic review and meta-analysis. Int J Paediatr Dent, 2017. 27(3): p. 201-209.

157. American academy of pediatric dentistry council on clinical affairs. Policy on interim therapeutic restorations (ITR). Pediatr Dent. 2017b;39(6):64–5 Policy on Interim Therapeutic Restorations (ITR). Pediatr Dent, 2017. 39(6): p. 57-58.

158. Hussein, I., et al., Use of the Hall technique by specialist paediatric dentists: a global perspective. Br Dent J, 2020. 228(1): p. 33-38.

159. Seifo, N., et al., Silver diamine fluoride for managing carious lesions: an umbrella review. BMC Oral Health, 2019. 19(1): p. 145.

160. Seifo, N., et al., The use of silver diamine fluoride (SDF) in dental practice. Br Dent J, 2020. 228(2): p. 75-81.

161. Alvear Fa B, Arron J, Wong A, Young D. Silver modified atraumatic restorative technique (SMART). Stoma Edu J. 2016;3(2):18-24.

162. Frencken, J.E., et al., Atraumatic restorative treatment (ART): rationale, technique, and development. J Public Health Dent, 1996. 56(3 Spec No): p. 135-40; discussion 161-3.

163. Saber, A.M., A.A. El-Housseiny, and N.M. Alamoudi, Atraumatic Restorative Treatment and Interim Therapeutic Restoration: A Review of the Literature. Dent J (Basel), 2019. 7(1).

164. Koubi G, Colon P, Franquin JC, Hartmann A, Richard G, Faure MO, Lambert G. Clinical evaluation of the performance and safety of a new dentine substitute, Biodentine, in the restoration of posterior teeth—a prospective study. Clinical oral investigations. 2013 Jan 1;17(1):243-9.

165. Frideres, T. and J. Gillette, Evidence-based dentistry professional development and training for the dental office team. J Evid Based Dent Pract, 2009. 9(3): p. 129-34.

166. Le, T.A.N. and A.T. Lo Sasso, Competition and market structure in the dental industry. Int J Health Econ Manag, 2020. 20(2): p. 201-214.

167. Manski, R.J., D. Hoffmann, and V. Rowthorn, Increasing Access to Dental and Medical Care by Allowing Greater Flexibility in Scope of Practice. Am J Public Health, 2015. 105(9): p. 1755-62.

168. Oral Health Workforce Research Center. Available at http://www.oralhealthworkforce.org/wp-content/uploads/2017/07/Single-Page-Layout-Final_July_2017.pdf#:~:text=ALLOWABLE%20TASKS%20for%20Dental%20Hygienists%20BY%20STATE%20Variation,improved%20oral%20health%20outcomes%20in%20a%20state%E2%80%99s%20population.1%2C2. Accessed: October 15, 2020.

169. Barry, M.J., Health decision aids to facilitate shared decision making in office practice. Ann Intern Med, 2002. 136(2): p. 127-35.

170. Vranceanu, A.M., C. Cooper, and D. Ring, Integrating patient values into evidence-based practice: effective communication for shared decision-making. Hand Clin, 2009. 25(1): p. 83-96, vii.

171. Shafir A, Rosenthal J. Shared decision making: advancing patient-centered care through state and federal implementation. Washington, DC: National Academy for State Health Policy; 2012

172. FDI Policy Statement: Minimal Intervention in the Management of Dental Caries. Adopted by the FDI General Assembly: 1 October 2002 – Vienna, Austria. Available at: http://www.fdiworlddental.org/resources/policy-statements-and-resolutions. Accessed: June 23, 2020.

173. Frencken JE, Peters MC, Manton DJ, Leal SC, Gordan VV, Eden E. Minimal Intervention Dentistry (MIC) for managing dental caries – a review: report of a FDI task group. Int Dent J. 2012;62(5):223–43.

174. Guideline on Restorative Dentistry. American Academy of Pediatric Dentistry. Reference Manual 2014;37(6):15–16.

175. Mitchell, S.T., et al., Satisfaction with dental care among patients who receive invasive or non-invasive treatment for non-cavitated early dental caries: findings from one region of the National Dental PBRN. BMC Oral Health, 2017. 17(1): p. 70.

176. Jonke, G., Negative online reviews and their ethical implications. J Am Dent Assoc, 2019. 150(7): p. 632-633.

177. Chakraborty, G., G.J. Gaeth, and M. Cunningham, Understanding consumers' preferences for dental service. J Health Care Mark, 1993. 13(3): p. 48-58.

178. Radfar, L. and L. Suresh, Medical profile of a dental school patient population. J Dent Educ, 2007. 71(5): p. 682-6.

179. Victoroff, K.Z., K.A. Williams, and J. Lalumandier, Dental students' reflections on their experiences with a diverse patient population. J Dent Educ, 2013. 77(8): p. 982-9.

180. Ramos-Gomez, F., et al., Pioneering and Interprofessional Pediatric Dentistry Programs Aimed at Reducing Oral Health Disparities. Front Public Health, 2017. 5: p. 207.

181. Barry MJ, Edgman-Levitan PA. Shared decision making – The pinnacle of patient-centered care. N Engl J Med 2012; 366:780-781.

182. Edelstein, B.L. and C.H. Chinn, Update on disparities in oral health and access to dental care for America's children. Acad Pediatr, 2009. 9(6): p. 415-9.

183. Kassebaum NJ, Smith AG, Bernabe E, Fleming TD, Reynolds AE, Vos T, Murray CJ, Mrcenes W, GBD 2015. Oral health collaboratives. Global, regional and national prevalence, incidence and disability-adjusted life years for oral conditions for 195 countries, 1990-2015: a systematic analysis for the global vurden of diseases, injuries and risk factors. J Dent Research. 2017; 96:380-387.

184. United States Department of Health, National Institute of Dental, Craniofacial Research. Oral health in America: a report of the Surgeon General. US Public Health Service, Department of Health and Human Services, 2000.

185. Daigler RM. Ten daily practice statistics every dentist should review. Dent Economics. Available at: https://www.dentaleconomics/practice/article/16390112/10-daily-practice-statistics-every-dentist-should-review. Accessed: September 7, 2020.

186. Apostolon D. Defining dental program capacity. DentaQuest Partnership for Oral Health Advancement. Available at: https://www.entaquestpartnership.org/about/keys-to-success/dfining-dental-program-capacity. Accessed: September 7, 2020.

187. American Dental Association News Brief. CDC reports 'cluster' of dental professionals diagnosed with lung disease. Available at: https://www.ada.org/en/publications/ada-news/2018-archive/march/cdc-reports-cluster-of-dental-professionals-diagnosed-with-lung-disease. Accessed: May 7, 2020.

188. Healthline. CDC investigating why dentists have come down with deadly lung disease. Available at: https://www.healthline.com/health-news/cdc-investigating-dentists-with-lung-disease#3. Accessed May 7, 2020.

189. American Dental Association. Return to work interim guidance tool kit. Available at: https://success.ada.org/~/media/CPS/Files/Open%20Files/ADA_Return_to_Work_Toolkit.pdf. Accessed: June 7, 2020.

190. Centers for Disease Control. COVID-19 guidance for dental care settings. Available at https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html. Accessed: June 7, 2020.

191. Occupational Safety Health Administration (OSHA). COVID-19 guidance for dentistry workers and employers. Available at https://www.osha.gov/SLTC/covid-19/dentistry.html. Accessed: June 7, 2020.

192. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. International Journal of Oral Science. 2020 Mar 3;12(1):1-6.

193. Samaranayake, L.P., J. Reid, and D. Evans, The efficacy of rubber dam isolation in reducing atmospheric bacterial contamination. ASDC J Dent Child, 1989. 56(6): p. 442-4.

194. Christensen, R Dentistry IQ https://www.dentistryiq.com/dental-hygiene/clinical-hygiene/article/16351012/aerosols

195. Narayana, T.V., et al., Role of preprocedural rinse and high volume evacuator in reducing bacterial contamination in bioaerosols. J Oral Maxillofac Pathol, 2016. 20(1): p. 59-65.

196. Willeford K. Coming back from COVID-19: The effect of PPE on American Dental Practices. Available at: https://thewillefordgroup.com/home/special-report-covid-19-and-ppe/. Accessed: May 27,2020.

197. Ge, Z.Y., et al., Possible aerosol transmission of COVID-19 and special precautions in dentistry. J Zhejiang Univ Sci B, 2020. 21(5): p. 361-368.

198. Gutierrez A. Sanitizing aMIC the COViD-19 outbreak. KSHB News. Available at: https://www.kshb.com/news/coronavirus/sanitizing-aMIC-the-covid-19-outbreak. Accessed: May 27, 2020.

199. Adams K. Dentists explore UV light technology as sanitation tool. Becker's Dental & DSO Review. Available at: https://www.beckersdental.com/clinical-leadership-infection-control/35624-dentists-explore-uv-light-technology-as-sanitation-tool.html. Accessed: May 27, 2020.

200. Epperly T, Bechtel C, Sweeney R, Greiner A, Grumbach K, Schilz J, Stream G, O'Connor M. The shared principles of primary care: a multi-stakeholder initiative to find a common voice. Family Medicine. 2019; 51:179-184.

201. Personalized Healthcare. What to know. Available at: https://dukepersonalizedhealth.org/personalized-health-care. Accessed: September 7, 2020.

202. Usvyat, L., L.S. Dalrymple, and F.W. Maddux, Using Technology to Inform and Deliver Precise Personalized Care to Patients With End-Stage Kidney Disease. Semin Nephrol, 2018. 38(4): p. 418-425.

203. Nicolau, B. and W. Marcenes, How will a life course framework be used to tackle wider social determinants of health? Community Dent Oral Epidemiol, 2012. 40 Suppl 2: p. 33-8.

204. Broadbent, J.M., et al., Oral Health-related Beliefs, Behaviors, and Outcomes through the Life Course. J Dent Res, 2016. 95(7): p. 808-13.

205. Gibson BJ, Kettle JE, Robinson PG, Walls A, Warren L. Oral care as a life course project: a qualitative grounded theory study. Gerodontology. 2019 Mar;36(1):8-17.

206. National Rural Health Association. Compendium of best rural oral health practices. NRHA, 2020.

207. McKernan, S.C., Kuthy, R., Tuggle, L. and García, D.T., Medical-Dental Integration in Public Health Settings: An Environmental Scan. University of Iowa Policy Center, 2018.

208. Overman B, Cogil C, Cahill A. Oral health and views of patients receiving integrated oral health in rural primary care. Oral health Dental Sci. 2019;3:1-6.

209. Reuben, D.B. and C.A. Sinsky, From Transactional Tasks to Personalized Care: A New Vision of Physicians' Roles. Ann Fam Med, 2018. 16(2): p. 168-169.

210. Glurich, I., et al., Integrating Medical-Dental Care for Diabetic Patients: Qualitative Assessment of Provider Perspectives. Health Promot Pract, 2018. 19(4): p. 531-541.

211. Navathe, A.S., et al., Effect of Financial Bonus Size, Loss Aversion, and Increased Social Pressure on Physician Pay-for-Performance: A Randomized Clinical Trial and Cohort Study. JAMA Netw Open, 2019. 2(2): p. e187950.

212. Gondi S, Chokshi DA. Financial stability as a goal of payment reform – A lesson from COVID-19. In JAMA Health Forum 2020 Aug 3 (Vol 1 No. 8 pp e201012-e201012.

213. Burns L, Vujicic M, Blatz A. Recent trends in the market for endodontics. Health Policy Institute Research Brief. American Dental Association. http://www. ada. org/~/media/ADA/Science% 20and% 20Research/HPI/Files/HPIBrief_0916_1. pdf. 2016.

214. Baumann K, Boyce M, Catapano-Martinez D. Transmission precautions for dental aerosols. Decisions in Dentistry. 2018; 4(12):30-32.

215. Rao RM, Shenoy N, Shetty V. Determination of efficacy of pre-procedural mouth rinsing in reducing aerosol contamination produced by ultrasonic scalers. Nitte University JHS. 2015; 5:52-56.

216. Grinshpun, S.A., et al., Control of aerosol contaminants in indoor air: combining the particle concentration reduction with microbial inactivation. Environ Sci Technol, 2007. 41(2): p. 606-12.

217. Veena, H.R., et al., Dissemination of aerosol and splatter during ultrasonic scaling: a pilot study. J Infect Public Health, 2015. 8(3): p. 260-5.

218. James R, Mani A. Dental aerosols: A silent hazard in dentistry! Int J Sci Res. 2016;5:1761-1763

219. Pina-Vaz I, Pina-Vaz C, de Carvalho MF, Azevedo A. Evaluating spatter and aerosol contamination during opening of access cavities in endodontics. Rev Clin Pesq Odontol. 2008; 4(2):77-83.

220. Laheij, A.M., et al., Healthcare-associated viral and bacterial infections in dentistry. J Oral Microbiol, 2012. 4.

221. West Virginia University. Researchers study ways to prevent lung disease in dental professionals. Available at: https://medicalxpress.com/news/2019-06-ways-lung-disease-dentistry-professionals.html. Accessed: May 7, 2020.

222. Avila, M., D.M. Ojcius, and O. Yilmaz, The oral microbiota: living with a permanent guest. DNA Cell Biol, 2009. 28(8): p. 405-11.

223. Brook, I., Microbiology of sinusitis. Proc Am Thorac Soc, 2011. 8(1): p. 90-100

224. Gomes-Filho, I.S., J.S. Passos, and S. Seixas da Cruz, Respiratory disease and the role of oral bacteria. J Oral Microbiol, 2010. 2.

225. Harrel, S.K. and J. Molinari, Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. J Am Dent Assoc, 2004. 135(4): p. 429-37.

226. Zemori C, de Soet H, Criellard W, Laheij A. a scoping review on bioaerosols in healthcare and the dental environment. PLoS One. 2017; 12:eo178007.

227. Paju, S. and F.A. Scannapieco, Oral biofilms, periodontitis, and pulmonary infections. Oral Dis, 2007. 13(6): p. 508-12.

228. Dutil, S., et al., Measurement of airborne bacteria and endotoxin generated during dental cleaning. J Occup Environ Hyg, 2009. 6(2): p. 121-30.

229. Nett RJ, Cummings KJ, Cannon B, Cox-Ganser J, Nathan SD. Dental personnel treated for idiopathic pulmonary fibrosis at a Tertiary Care Center—Virginia, 2000–2015. Morbidity and Mortality Weekly Report. 2018 Mar 9;67(9):270.

230. Kuehn B. Dentists at risk of lung disease?. Jama. 2018 Apr 24;319(16):1650-.

231. Raghu, G., et al., An official ATS/ERS/JRS/ALAT statement: idiopathic pulmonary fibrosis: evidence-based guidelines for diagnosis and management. Am J Respir Crit Care Med, 2011. 183(6): p. 788-824.

232. Spagnolo P, Sverzellati N, Rossi G, et al. Idiopathic pulmonary fibrosis: an update. Ann Med 2015;47:15–27.

233. Casamassimo, P.S., Safety in dental care: Where is our surveillance imperative? J Am Dent Assoc, 2020. 151(6): p. 381-383.

234. Bergenstal, T.D., et al., Personalized Care Plans: Are They Effective in Decreasing ED Visits and Health Care Expenditure Among Adult Super-Utilizers? J Emerg Nurs, 2020. 46(1): p. 83-90.

235. Centers for Disease Control. Return on investment: healthcare systems savings. Available at: https://www.cdc.gov/oralhealth/infographics/roi-healthcare.html. Accessed: September 4, 2020.

236. Tiwari, T., et al., Association between Medical Well-Child Visits and Dental Preventive Visits: A Big Data Report. JDR Clin Trans Res, 2019. 4(3): p. 239-245.

237. Nowak, A.J. and P.S. Casamassimo, The dental home: a primary care oral health concept. J Am Dent Assoc, 2002. 133(1): p. 93-8.

238. Walsh LJ, Brostek AM. Minimum intervention dentistry principles and objectives. Australian Dental Journal. 2013; 58:3-16.

239. Groth L. Is it safe to go to the dentist? Health.com. Available at: https://www.health.com/condition/infectious-diseases/coronavirus/is-it-safe-to-go-to-the-dentist-during-covid-19. Accessed: June 23, 2020.

240. Galewitz P. Touching a nerve: dental offices reopening. NBC News. Available at: https://www.nbcnews.com/health/health-news/touching-nerve-dental-offices-reopening-routine-care-aMIC-pandemic-n1210341. Accessed: June 23, 2020.

241. Fair Health Consumer Access. Costs for a hospital stay for COVID-19. Available at: https://www.fairhealth.org/article/costs-for-a-hospital-stay-for-covid-19. Accessed: June 23, 2020.

242. Elizabeth A. How much does it cost to get COVID-19? The Atlantic. Available at: https://www.theatlantic.com/health/archive/2020/04/how-much-does-it-cost-to-get-covid-19/610813/. Accessed: June 23, 2020.

243. Here's a look at who is most at risk of contracting COVID-19 and how much they earn for taking that risk: Available at: https://www.marketwatch.com/story/heres-a-look-at-who-is-most-at-risk-of-contracting-covid-19-and-how-much-they-earn-for-taking-that-risk-2020-04-16. Accessed: June 24, 2020.

244. How Will Dentistry Respond to the Coronavirus Disease 2019 (COVID-19) Pandemic? Available at: https://jamanetwork.com/channels/health-forum/fullarticle/2766388. Accessed: June 24, 2020.

245. Berwick, D.M., T.W. Nolan, and J. Whittington, The triple aim: care, health, and cost. Health Aff (Millwood), 2008. 27(3): p. 759-69.

246. Vujicic, M., Our dental care system is stuck: And here is what to do about it. J Am Dent Assoc, 2018. 149(3): p. 167-169.

247. Halfon, N., et al., Applying a 3.0 transformation framework to guide large-scale health system reform. Health Aff (Millwood), 2014. 33(11): p. 2003-11.

248. Langelier, M., et al., *Expanded Scopes Of Practice For Dental Hygienists Associated With Improved Oral Health Outcomes For Adults.* Health Aff (Millwood), 2016. 35(12): p. 2207-2215.

249. Weldring T. and R. Golden, *Core principles & values of effective team-based health care.* 2012: National Academy of Sciences.

250. Texas Health Institute, *Oral Health in Texas: Bridging Gaps and Filling Needs: A Report on the Burden of Oral Disease in Texas.* 2018, Texas Health Institute: Austin, Texas. p. 190.

251. DentaQuest: Oral Health Matters. Providers Worry about PPE, New Protocols. Available at: https://whatsnew.dentaquest.com/providers-worry-about-ppe-new-protocols/. Accessed: July 19, 2020.

252. Weldring T, Smith SM. Article commentary: patient-reported outcomes (pros) and patient-reported outcome measures (PROMs). Health services insights. 2013 Jan;6:HSI-S11093.

253. Ríordáin RN, Wiriyakijja P. Patient reported outcome and experience measures of oral disease in oral medicine. British dental journal. 2017 Nov;223(9):713.

254. Gerrard, G., R. Jones, and R.J. Hierons, *How did we do? An investigation into the suitability of patient questionnaires (PREMs and PROMs) in three primary care oral surgery practices.* Br Dent J, 2017. 223(1): p. 27-32.

255. CMS Research Statistics Data and Systems. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected. Accessed: May 22, 2020.

256. Nasseh K, Vujicic M. Modeling the impact of COVID-19 on U.S. dental spending. American Dental Association Health Policy Institute. Available at: https://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIbrief_0420_1.pdf?la=en. Accessed: May 22, 2020.

257. Dyrda L. The dental industry amid COVID-19: Five statistics and projections. Beckers Dental and DSO Review. Available at: https://www.beckersdental.com/benchmarking/35543-the-dental-industry-amid-covid-19-5-statistics-and-projections.html. Accessed: July 27,2020.

258. Congressional Budget Office. CBO's Current Projections of Output, Employment, and Interest Rates and a Preliminary Look at Federal Deficits for 2020 and 2021. Available at: https://www.cbo.gov/publication/56335. Accessed: May 22, 2020.

259. Jacobs PD, Hill SC, Abdus S. Adults are more likely to become eligible for Medicaid during recessions and if their state expanded Medicaid. Health Affairs. 2020; 36(1):32-39.

260. Hall, J.P., S.L. Chapman, and N.K. Kurth, *Poor oral health as an obstacle to employment for Medicaid beneficiaries with disabilities.* J Public Health Dent, 2013. 73(1): p. 79-82.

261. Lee, J.Y., et al., *Oral health literacy levels among a low-income WIC population.* J Public Health Dent, 2011. 71(2): p. 152-60.

262. Seirawan, H., S. Faust, and R. Mulligan, *The impact of oral health on the academic performance of disadvantaged children.* Am J Public Health, 2012. 102(9): p. 1729-34.

263. Halasa-Rappel, Y.A., et al., *Broken smiles: The impact of untreated dental caries and missing anterior teeth on employment.* J Public Health Dent, 2019. 79(3): p. 231-237.

Methodological Appendix

Benefit Design Considerations

There are four primary components used to estimate a per-member, per-month fee for each of the various code packages under consideration; different assumptions and resources were employed to estimate each component.

1. **Per Visit Cost**
   a. The per-visit cost was generally calculated by looking at the 40th percentile of the 2020 NDAS fees (https://wasserman-medical.com/shop/product/national-dental-advisory-service-2020-fee-report-book/) for all the code variations listed in the package.
   b. Because Medicaid reimbursement rates are lower than commercial reimbursement rates, we further reduced the fees by using the average reimbursement in Medicaid, for both children (age 20 and under) and adults (age 21 and older), as a proportion of commercial fees from available reports (https://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_0417_1.pdf). If there are wide variations in fees in each portion of the package (i.e., 40th percentile fees for teledentistry can range from $29 to $119, depending on the type of visit), we took the average fee in each category. However, we also produced a range of high and low estimates using the highest and lowest fees for each portion of the package (Domain 1) or by taking the 40th and 60th NDAS fee schedule for each package (Domain 2).
   c. For overall population fee estimates, fees were then weighted based on the relevant portion of the child vs. adult population that uses those broad type of benefits, based on calculations from the 2017 IBM Watson Medicaid MarketScan data. For example, 76% of all the diagnostics and preventive visits are made by children, whereas 24% are made by adults.

2. **Number of visits each member that utilizes the service will have per year**
   a. These were generally based on current reimbursement practices, clinical guidelines, or analysis of existing Medicaid data.
      i. Estimates for the oral health package and the periodontal management package assumed two visits per year, while the caries prevention and management package assumed one visit per year.
      ii. The emergency telehealth package used an estimate of 1.15 visits per year, which came from an analysis of the average number of emergency dental visits among those who used emergency dental services in the 2017 IBM Watson Medicaid MarketScan Data.

3. **Utilization of Services**
   a. Estimates of the utilization of each package were derived from analysis of existing Medicaid data, estimates of the burden of disease, and the estimated impact of the packages. Because utilization varies for children and adults, utilization was calculated separately for those two groups.
   b. Estimates of the utilization of the emergency telehealth visit were derived from the proportion of the enrolled population that had an emergency dental visit in 2017, using the IBM Watson Medicaid MarketScan data (2.6% among children, 3% among adults, 2.9% overall).
   c. Estimates of the oral health package and asynchronous oral health package were derived from the utilization of diagnostic and preventive dental services in the 2017 IBM Watson Medicaid MarketScan data (43% for children, 14% for adults, 29% overall).
   d. Estimates of utilization of caries and periodontal packages were derived from the proportion receiving treatment of these diseases in the 2017 Medicaid MarketScan Data (periodontal disease is .2% for children and 1% for adults, caries is 15% for children and 8% for adults) and the incidence of the diseases in the population (untreated dental decay rate is 23% of children and 50% of adults, https://www.cdc.gov/nchs/data/hus/2018/028.pdf; 42% adults have periodontal disease https://jada.ada.org/article/S0002-8177%2818%2930276-9/fulltext).

4. **Number of Medicaid Members**
   a. The total population enrolled in Medicaid was derived from Jan. 2020 reports of the Medicaid/CHIP population of the United States (https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html).

5. **Limitations to Benefit Design Considerations**
    a. The benefit designs captured herein did not capture all sources of variation in terms of population demographics, including race/ethnicity, special needs population, socio-economic status or social determinants of health, practice location, or state policy environments. It is anticipated these benefit designs will need to be adjusted for the specific environments in which they are implemented based on these and other considerations.

Projections

Projections of Medicaid dental spending from Oct. 2020 through Dec. 2022 were created using data from a variety of sources and include several sets of assumptions.

1. Pre-COVID-19 estimates of dental spending are from CMS estimates of National Health Expenditures (https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected). Estimates of monthly cost variations come from the 2016/2017 IBM Watson Medicaid MarketScan Database.
2. Estimates of COVID-19 Medicaid spending are built on assumptions found in the ADA Health Policy Institute modeling of the impact of COVID-19 on U.S. dental spending (https://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIbrief_0420_1.pdf?la=en) along with insights generated from the DentaQuest Partnership's survey of Medicaid providers (https://www.dentaquestpartnership.org/system/files/DQP_DentalCare%27sNewNormal_CommunicationsBrief_v2_6.3.20.pdf). The modeling assumes 80% recovery of dental spending by May 2021 and 95% recovery by May 2022.
3. Estimates of the increase in Medicaid spending associated with increased unemployment were derived from evidence that each 1% increase in unemployment is associated with a .635% increase in Medicaid enrollment (https://www.healthaffairs.org/doi/10.1377/hlthaff.2016.1076). Projections of the unemployment rate came from the Congressional Budget Office (https://www.cbo.gov/publication/56335).
4. Estimates of reductions decrease in Medicaid spending associated with adult dental benefit cuts assumed that roughly half the states will cut adult dental benefits, which is consistent with evidence from the last recession, in which one-quarter of states cut adult dental benefits. It is also consistent with evidence from the Medical Expenditure Panel Survey, which found that spending on Medicaid dental services is driven more by policy changes than by recessionary periods.
5. Estimates of the impact integrating the three domains into Medicaid policy assumed that implementation will be slow initially but will gradually grow. Because the packages allow staff to become more efficient, they will allow for increasing utilization at lower PMPM costs. These may allow states to maintain benefits for adults as well.
6. Similar to many schools and business (https://www.nytimes.com/2020/05/19/us/coronavirus-college-fall-semester.html), dentistry may need to be prepared for a resurgence of COVID-19 in the winter of 2020/21 that may result in new closures. Although it is impossible to determine exactly what will happen, our modeling assumed a decrease in dental spending associated with new restrictions, and a slower return to normal as more practices close permanently. Because the packages in the three domains are designed to allow continued operation in COVID-19 environment, widespread adoption would allow practices to maintain their practice, even in the face of a resurgence and future pandemic occurrences.

APPENDIX B – The Importance of Risk Stratification

A methodology employed in oral health disease management is risk stratified assessment and treatment. The American Academy of Family Physicians calls Risk Stratified Care Management (RSCM) the process of assigning a health risk status to a patient and using the patient's risk status to direct and improve care. The goal of RSCM is to help patients achieve the best health and quality of life possible by preventing chronic disease, stabilizing current chronic conditions, and preventing acceleration to higher-risk categories and higher associated costs.[1] A recent review article explained that "in dentistry, risk assessment is most commonly used to evaluate caries or periodontal disease activity and serve as a foundation for care goals and patient communication. The risk assessment aids care teams in understanding the probability of oral disease development, and prospects for changes in the disease process due to protective, behavioral, and/or clinical interventions."[2] Currently, risk stratification occurs more often in practice for caries diseases than for periodontal diseases. This is most likely due to the development of reimbursement structures in fee-for-service contracts as well as an increased need for population health in alternative payment model structures.[3-5] Risk assessment activities provide a structure that coaches and stimulates individuals toward achieving oral health. Given the importance of risk stratified care, we provide an evaluation of caries risk assessment utilization in dentistry.

In an analysis of a community-based oral health program operating in a value-based contract by the DQP for this report, claims analysis demonstrated less need for emergency care and surgical intervention as well as improved preventive participation for those individuals who received an oral health assessment and anticipatory guidance with caries risk stratification in a community setting[00] (Figures s1B and 2B). It was also found that the individuals who received a community-based assessment incurred costs that were $253 less annually than those without an assessment visit. This program demonstrated success utilizing lower cost, dental hygienist-led

[00] Community setting means a location outside a hospital inpatient, acute care setting or a 'brick-and-mortar" dental care site usually designed to improve convenience and access. A community setting may include, but is not limited to, a home, group home, assisted living or long-term care, facility, correctional facility, hospice, or school-based care.

teams, which provided an opportunity for dentists to increase chair time for operative dentistry. It should be noted that the structure of these processes could also be adapted into a teledentistry model that could positively have a positive impact on practice overhead and offer additional revenue sources for care team operations.

Relationship between a visit with caries risk assessment procedures in 2018 on Oral Health in 2019

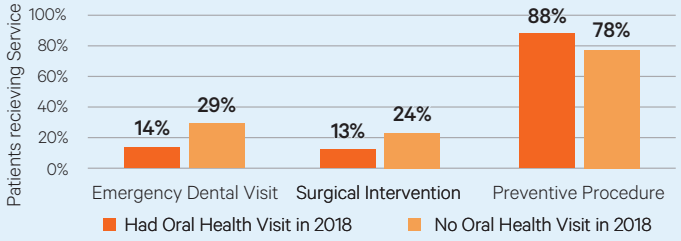


Figure 1B. *Relationship between a visit with caries risk assessment procedures in 2018 on Oral Health in 2019*

Average Annual Cost of Dental Care in 2019

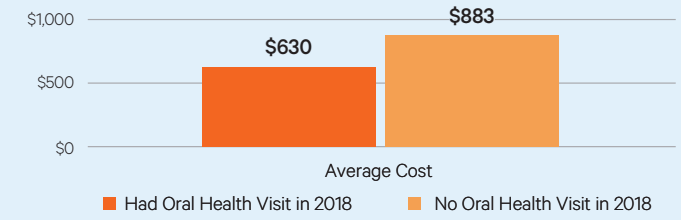


Figure 2B. *Average Annual Cost of Dental Care in 2019*

Currently, there is no consensus on which caries risk assessment tool or process is best, and frameworks for easy adoption are limited. Many care teams and organizations have developed their own methodology to best risk stratify their patient populations, with some organizations using analytics to adapt into a more user-friendly care flow process. In addition, there are some differences between the risk assessment processes used for other chronic conditions in which "rising risk" is a category alongside low and high-risk selections. In dentistry, most risk assessment tools include a "moderate risk" category instead of "rising risk," which can be difficult to pinpoint and track in current dental practice.

Risk stratification improves surgical processes and outcomes.[5-9] The discovery of disease burdens can steer patients toward better health, while risk stratification can lead to lower cost and increased revenue for dental practices. In a DQP analysis of risk-stratified cost of an interprofessional program, it was observed that individuals with higher caries risk were more likely to cost more and need more extensive dental surgical intervention (Figure 3B).[10]

PMPM modeling of risk-stratified care utilizing this scenario is presented in Figure 4B. This figure assumes risk stratification follows the distribution shown in Table 1B; oral health telehealth package costs; and in-office visits for an evaluation, prophylaxis, and oral hygiene instructions; and (for children) a fluoride varnish application

Risk Stratified Annual Surgical Dental Intervention Costs

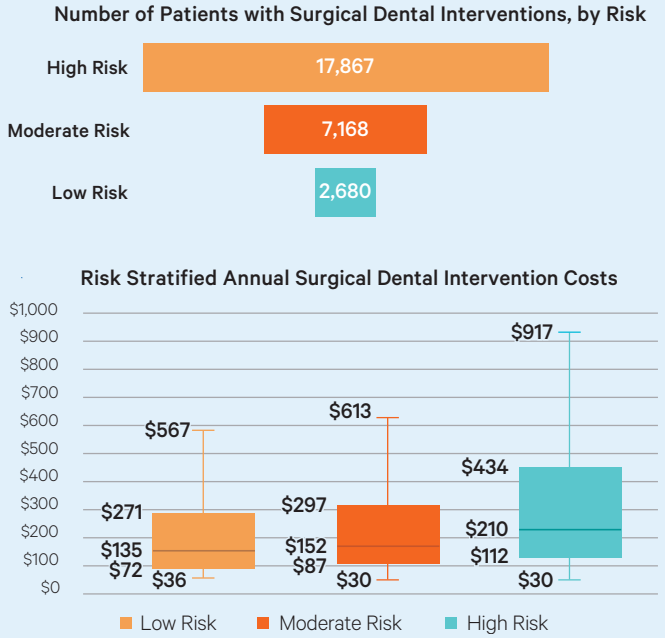
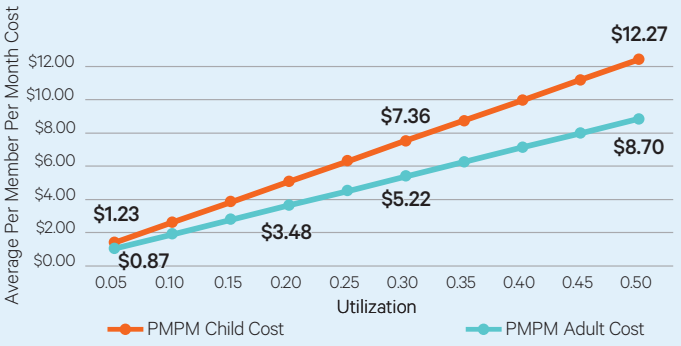


Figure 3B. *Risk Stratified Annual Surgical Dental Intervention Costs*

Average PMPM of Risk Stratified Oral Health Telehealth Package and In-Office Diagnostic and Preventive Care



Assumes low risk patients have 1.5 to 2.5 oral health telehealth visits per year, moderate risk patients have 1.5 to 2 oral health telehealth visits per year and 1 in-office visit per year, and high risk patients have 2 to 2.5 oral health telehealth visits and 1-2 in-office visits per year.

Figure 4B. *Average PMPM of Risk Stratified Oral Health Telehealth Package and In-Office Diagnostic and Preventive Care*

Table 1B. *Distribution of Caries Risk among Medicaid Enrolled Children and Adults*

	Child	Adult
Low	25%	12%
Moderate	14%	20%
High	61%	67%

Sources: Children's risk stratification; Halasa-Rappel YA, Ng MW, Gaumer G, Banks DA. How useful are current caries risk assessment tools in informing the oral health care decision-making process?. J Am Dent Assoc. 2019;150(2):91–102.e2. doi:10.1016/j.adaj.2018.11.011.

Adult risk stratification; DQP Analysis of Advantage Dental Data

at average Medicaid reimbursement rates.[11] These PMPM rates cost less than the existing PMPM that most Medicaid plans pay ($13.45 for children with 43% average utilization, and $7.44 for adults at 14% utilization) even at higher levels of utilization. The use of an oral health telehealth package for risk-stratified care is significantly less expensive than utilizing in-office visits exclusively to provide this care (Figure 5B).

Average PMPM for Risk Stratified Care for Children

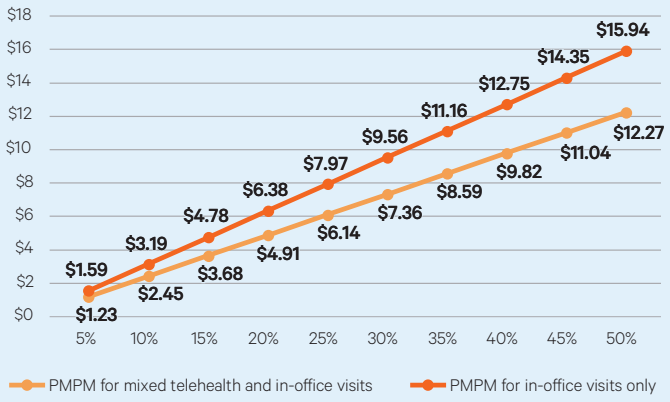


Figure 5B. *Average PMPM for Risk Stratified Care for Children*

Appendix B References:

1. American Academy of Family Physicians. High Impact Changes for Practice Transformation. Available at: aafp.org/practice-management/transformation/pcmh/high-impact.html. Accessed June 7, 2020.
2. Boynes SG, Novy BB, Peltier C. Risk-based treatment planning. Decision in Dentistry. Available at: https://decisionsindentistry.com/article/risk-based-treatment-planning/. Published February 7, 2017. Accessed May 15, 2020.
3. Fontana M, Zero DT. Assessing patients' caries risk. J Am Dent Assoc 2006;137:1231-9.
4. Riley JL, Gordan W, Ajmo CT, Bockman H, Jackson MB, Gilber GH. Dentists' use of caries risk assessment and individualized caries prevention for their adult patients: findings from the dental practice-based research network. Community Dent Oral Epidemiol. 2011;39:564-573.
5. Featherstone JD, Domejean-Orliaguet SO, Jenson L, Wolff M, Young DA. Caries risk assessment in practice for age 6 through adult. J Calif Dent Assoc. 2007;35:703-13.
6. Schanzer A, Mega J, Meadows J, Samson RH, Bandyk DF, Conte MS. Risk stratification in critical limb ischemia: derivation and validation of a model to predict amputation-free survival using multicenter surgical outcomes data. Journal of Vascular Surgery. 2008 Dec 1;48(6):1464-71.
7. Lambert EH, Pierorazio PM, Shabsigh A, Olsson CA, Benson MC, McKiernan JM. Prognostic risk stratification and clinical outcomes in patients undergoing surgical treatment for renal cell carcinoma with vascular tumor thrombus. Urology. 2007 Jun 1;69(6):1054-8.
8. Buchlak QD, Kowalczyk M, Leveque JC, Wright A, Farrokhi F. Risk stratification in deep brain stimulation surgery: Development of an algorithm to predict patient discharge disposition with 91.9% accuracy. Journal of Clinical Neuroscience. 2018 Nov 1;57:26-32.
9. Ko FC. Preoperative frailty evaluation: a promising risk-stratification tool in older adults undergoing general surgery. Clin Ther. 2019;41(3):387-399. doi:10.1016/j.clinthera.2019.01.014
10. National Rural Health Association. Compendium of Rural Oral Health Best Practices. Available at: https://www.ruralhealthweb.org/NRHA/media/Emerge_NRHA/Program%20Services/2020/NRHA-2020-Compendium-of-Rural-Oral-Health-Best-Practices.pdf. 2020. Accessed June 9, 2020.
11. American Dental Association. Fluoride: Topical Fluoride and Systemic Supplements. https://www.ada.org/en/member-center/oral-health-topics/fluoride-topical-and-systemic-supplements. Updated May 1, 2019. Accessed June 7, 2020.

CareQuest Institute for Oral Health

CareQuest Institute for Oral Health is a national nonprofit championing a more equitable future where every person can reach their full potential through excellent health. We do this through our work in grantmaking, research, health improvement programs, policy and advocacy and education as well as our leadership in dental benefits, care delivery and innovation advancements. We collaborate with thought leaders, health care providers, patients and local, state and federal stakeholders, to accelerate oral health care transformation and create a system designed for everyone. To learn more, visit carequest.org.

This report and others are available at carequest.org.