Improving Oral Healthcare Access for Virginia's Medicaid Population

Options for enhancing the adult Medicaid dental benefit in Virginia.

Prepared for: Virginia Health Catalyst

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Disclaimer

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency.

Honor Code

On my honor, I have neither given nor received unauthorized aid on this assignment.

John Green
MPP Class of 2021

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Client Profile: Virginia Health Catalyst

Virginia Health Catalyst is a statewide coalition of stakeholders seeking to improve the oral health of all Commonwealth residents. Catalyst partners include medical & dental providers, community health workers, home visitors, and health advocates.

Founded in 2010, the organization was formerly named the Virginia Oral Health Coalition.

Virginia Health Catalyst's Mission:

Ensuring Virginians have equitable access to comprehensive health care that includes oral health by:

- Championing supportive federal, state, and local policies through advocacy work.
- Facilitating community-based initiatives to address known barriers to oral health access through regional alliances.
- Building a health system that includes oral health as an integral part of comprehensive health through oral health integration efforts.
- Fostering a community that understands health care is an equity issue and seeks to learn from others through learning events and an annual Summit.

Logo, information, and text adapted from: (*Our History*, n.d.)

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Acronym Glossary

ADA: The American Dental Association

DHP: Virginia Department of Health Professions

DMAS: Department of Medical Assistance Services

ED: Emergency Department

FTE: Full-Time Equivalent

HPSA: Health Professional Shortage Area

NPV: Net Present Value

Executive Summary

Oral health is a valuable component of overall health, yet it has been treated separately from the medical trades. One of the most consequential impacts of the separation has been the omission of preventative dental care in most public insurance and public health contexts in the United States. Thanks to extensive work by Virginia Health Catalyst and allies around the Commonwealth, the General Assembly added a comprehensive adult dental benefit to the state's Medicaid plan during the 2020 legislative session. Starting on July 1st, 2021, adult beneficiaries of Virginia's Medicaid plan will no longer see their preventative oral health needs neglected.

The adult Medicaid dental benefit is a victory for oral health, but its passage raises the question of what direction oral health advocates might pursue next. This document opens with background on relevant metrics and regulations impacting oral health in Virginia. This paper then considers 5 policy options for improving the oral health of Medicaid patients by increasing the availability of providers for beneficiaries:

1. Status Quo (the new Medicaid benefit without further action)
2. Increasing Medicaid Rates
3. Grants to New Dental Providers
4. Creating a Dental Therapist Role
5. Enhancing Dental Hygienists Through Remote Supervision

Each policy is assessed for its population equity, cost effectiveness, political feasibility, and ability to be implemented. These criteria are used to analyze the overall tradeoffs of each potential policy.

This assessment finds that reducing restrictions on dental hygienists, specifically through revision to Virginia's current remote supervision rules, to be the best-ranked policy. Though the magnitude of this impact is moderate, it comes at a low cost and gives providers the most flexibility to sustainably care for hard-to-reach populations.

Problem Statement and Introduction

Too many low-income Virginians, particularly in rural areas, are unable to access oral healthcare.

Rural populations across the United States face well-known challenges with economic opportunity, transportation, education access, graying demographics, and lacking telecommunications. Included among the constellation of issues facing rural populations is oral health; the preventative care available to the population's teeth. By one key measurement, having had a dental visit within the past year, rural Americans trailed those who lived within a Metropolitan Statistical Area (MSA) by up to 9.5 percentage points (*Table 37*, 2018). Similar to the medical workforce, dental practitioners are less likely to be based in rural areas and often physically distant from those who need their care; about 20% of Americans live in a rural area, but only 14% of dentists practice in the same territory (McFaland et al., 2012).

Virginia's own oral health challenges mirror national trends. In 2018 there were approximately 1.2 million Virginians, predominately in rural areas, who suffered from a shortage of dental professionals (O'Connor et al., 2018). According to data from the Health Resources and Services Administration, 87 out of 134 (65%) counties in Virginia are classified as dental health provider shortage areas and nearly all of the southwestern part of the state is classified as a shortage area (*Map of Health Professional Shortage Areas*, n.d.). The persons living in this area are likely over-represented in the 3.2 million Virginians who lacked any dental insurance before 2021 (*Dental Statistics and Research*, n.d.).

Oral health challenges are not unique to rural America, nor is this health problem a new one. In 2000, the U.S. Surgeon General David Satcher issued a report on oral health in America, describing the state of care as representing a "silent epidemic" among vulnerable groups of Americans (*Oral Health in America: A Report of the Surgeon General*, 2000). Reliable international data are hard to find, but it does appear the United States is not a world leader in oral health. The Organization for Economic Co-operation and Development (OECD) ranks member nations on several health metrics; the USA placed 14th out of 18 countries for the number of professionally active dentists per capita in 2017 (*Health Care Resources: Dentists*, 2020). This is far from conclusive about the national state of oral health, but it suggests work still needs to be done to address the former Surgeon General's concerns.

Background on Oral Health Situation

The following subsections provide background information and context relevant to oral health in Virginia. Information reflects the best data available as of late 2020 through early 2021. Any future readers are reminded that the forthcoming adult dental benefit for Virginia's Medicaid beneficiaries will significantly alter the situation within a few months.

Health Metrics

A significant complication when examining oral health is a paucity of nationally robust quality measurements. A report written by the American Dental Association, on behalf of the Dental Quality Alliance, summarized the situation: "[research] by the DQA demonstrated a significant lack of standardized set of measures between public and private sectors and across communities, state, and national levels" Some federal data exist on oral health indicators, such as for untreated caries or tooth extractions, but these results are often based on small sample sizes at the state or regional level. While such general results are useful for a national snapshot, they lack the detail to reliably function at a local or county level.

Despite the limits on nationally collected data, some useful information does exist within the state. A recent survey from the Virginia Dental Association (VDA) suggests that about half the Virginians in the rural southwest received an annual dental checkup, and ten percent of adults statewide had not seen a dentist at all within the past decade (Lacey, 2018). In contrast, the National Center for Health Statistics estimates that about 65% of American adults received a dental exam or cleaning within the last year (Clarke, 2020). The most recent data from the Virginia Behavioral Risk Factor Surveillance Survey is dated, but suggests a trend similar to the VDA survey's findings: 69% of the statewide population had a dental visit within the past year, but the Southwestern region's population averaged about 63% while northern Virginia averaged 75% (*Dental Visit at the State, Health Region, and Health District Levels, Virginia, 2012-2013 1*, n.d.).

Since data on preventative services performed by dentists and hygienists are limited or fragmented, some creativity is required for research. For people without access to preventative care, an unfortunately common destination are emergency departments (EDs) when their oral health deteriorates to a critical point. Care in the ED is expensive and usually ineffective but, due to the stronger collection standards for hospital EDs, offers an excellent proxy for unmet preventative care needs (Singhal et al., 2015). About 16,000 Virginians on Medicaid were estimated to have undertaken 19,000 visits to the ED for dental reasons in 2018 (Masters, 2020). Data from the National Hospital Ambulatory Medical Care Survey suggest that about 1.9% of the nation's 517 million emergency department visits between 2010 and 2013 were the result of dental complaints (Singer et al., 2017).

Workforce

Reports from the state of Virginia Healthcare Workforce Data Center found a total of 7,593 licensed dentists, of whom 5,692 were actively working in 4,400 full-time equivalent (FTE)

positions in 2019 (Brown, 2019b). As a proportion of the population, the American Dental Association (ADA) states that Virginia has 63.19 dentists per 100,000 residents, which is slightly above the national average of 61.06 (*Supply & Profile of Dentists: 2001-2019*, 2020). As a point of comparison, Virginia's neighbors have dentist averages per 100,000 of: 52.55 (North Carolina), 70.56 (Maryland), 47.88 (West Virginia), 47.43 (Tennessee), and 57.03 (Kentucky) (*Supply & Profile of Dentists: 2001-2019*, 2020).

Virginia may appear to fare well with workforce given these numbers, but this obscures a problem with distribution. Federal data report that about 1.2 million Virginians live in counties classified as dental provider shortage areas (O'Connor et al., 2018), with 65% of Virginia's counties meeting this classification (*Map of Health Professional Shortage Areas*, n.d.). A map created by the Virginia Healthcare Workforce Data Center (figure 1, at right) helps visualize this disparity; the lightly shaded regions have the fewest FTE dentists per capita (Brown, 2019b). We see a clear concentration of workforce in the affluent northeastern part of the state, but little workforce in the less affluent and generally rural southern and western areas of the state.

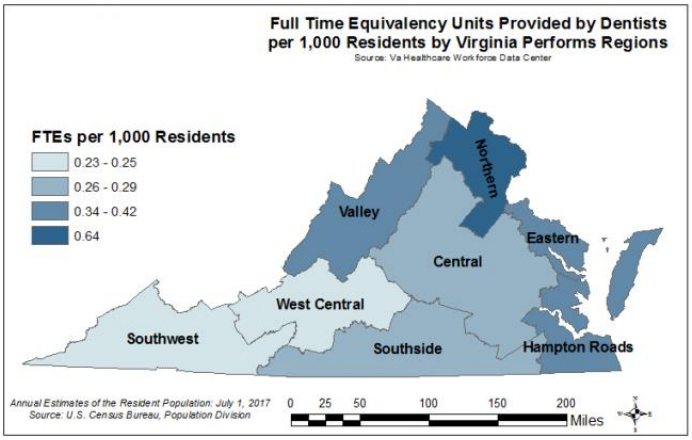

Figure 1: Dentists per-capita in Virginia (Brown, 2019b)

Mid-level providers, in the form of dental hygienists, are also a valuable resource in oral healthcare expertise. While there were slightly more than 6,000 licensed dental hygienists in 2019, many of these only worked part-time; the state calculates there are about 3,400 full-time equivalent positions. The regional workforce distribution of dental hygienists, measured by per capita FTE (figure 2, at right), has a generally inverse relationship to the concentration of dentists in state data (see figure 1, above) (Brown, 2019a). Thus, regions without adequate supervising dentists may still have hygienists who could provide care.

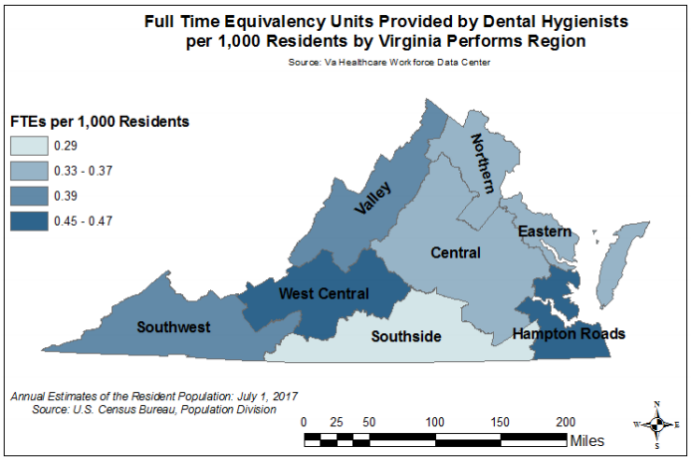

Figure 2: Dental Hygienists per capita (Brown, 2019a)

Regulations and the Workforce

Dentistry rules and regulations in Virginia are set at the state level (*Licensure Overview*, n.d.), being enacted through a combination of state legislation and interpretation by the Department of Health Professions (DHP). The Virginia General Assembly enacts law directing the relevant board, contained within DHP, to implement the text of the law. For example: in 2008 House Bill 1431 amended the Virginia Code and directed the Board of Dentistry ("the board") to create, under Article 4, licensing and oversight regulations for the practice of Dental Assistants for the first time (*Bill Tracking - 2008 Session > H 1431*, 2008).

Current law directs that the Board oversee dentists, dental hygienists, and dental assistants. In the state of Virginia, § 54.1-2702 defines that the Board of Dentistry shall consist of 10 members: 7 dentists, 1 citizen member, and 2 dental hygienists. These members are selected through a recommendation to the Governor by state dental societies and licensed practitioners. However, the Governor may select a member who is not among the nominees submitted if they so choose. (*Code of Virginia - Title 54.1. Professions and Occupations*, n.d.).

Dental hygienists have long been authorized to practice in Virginia, providing services under the supervision of the dentist who employs them. In Virginia, § 54.1-2722 spells out the details of hygienist training and scope of practice. Broadly permitted services for hygienists are identified as "services that are educational, diagnostic, therapeutic, or preventive" and take place under the supervision of a licensed dentist. The current code expressly prevents hygienists from establishing "a final diagnosis or treatment plan" for a patient, which requires a licensed dentist. (*§ 54.1-2722. License; Application; Qualifications; Practice of Dental Hygiene; Report*, n.d.)

Supervision Rules

An important detail in discussions about mid-level providers is the degree of supervision they operate under. As noted in the preceding paragraphs, dental hygienists and dental assistants are not permitted fully independent practitioners; in some manner their work must be reviewed by a supervising dentist. The supervision rules can vary depending on the procedure involved, the experience of the mid-level practitioner, who is employing the practitioner, and the location at which service is being provided. Chapter 21, Part 1 of the Virginia Administrative Code provide the full definitions of supervision types, of which my summaries appear below (*18VAC60-21-10. Definitions.*, n.d.):

- Direct Supervision: A dentist examines a patient and then delegates treatment to a dental hygienist and "remains immediately available in the office" for consultation.
- General Supervision: A dentist completes an examination and indicates what specific services are required to a hygienist. The dentist need not be present while the dental hygienist executes these services.
- Immediate Supervision: The dentist is in the room while the procedure is taking place.

- Indirect Supervision: The dentist examines a patient at some point during their visit and remains on-premises while a hygienist or dental assistant performs services.
- Remote Supervision: The dentist is available for communication during service delivery, but has not conducted an initial examination.

There have been several laws enacted by the legislature in recent years that directed the Board to liberalize dental hygienists' licensed capabilities and scope of practice. The creation of a Remote Supervision designation for experienced hygienists created important opportunities for dental care without a physician immediately present. The state makes an important distinction between state-employed public health dental hygienists (of which there are fewer than a dozen) and privately employed ones. Non-state remote supervision hygienists may only perform procedures in narrowly defined safety net settings, and must typically have a licensed dentist examine their patients within 90 days of them beginning services. Failing to satisfy the 90-day examination prevents payment by Medicaid and contributes to apprehension on using this supervision option. (S. B. Holland et al., personal communication, October 23, 2020; S. Pharr, personal communication, February 15, 2021)

Payment and Insurance Market

The federal government exerts less influence on the dental industry through payment policy than in medicine. The Centers for Medicare & Medicaid Services, as the nation's largest health services payors, can shift national trends with their payment rates and policy conditions. However, Medicare does not provide coverage for dental services outside narrow exceptions, including emergencies, services required as part of an inpatient hospital stay, or in some Medicare Advantage plans (also called "Part C") that are brokered by private insurance companies (*Dental Service Coverage*, n.d.).

Medicaid is a program jointly operated by individual states and the federal government, and state-level latitude on how insurance coverage is structured can be significant. Depending on the state, and the specifics of a procedure, a Medicaid plan may include dental coverage. Due to its focus on low-income populations, Medicaid is particularly valuable for helping those with limited means to obtain care. Children eligible for the Medicaid Children's Health Insurance Program (CHIP) are required by law to receive dental coverage from their states' plans, but there is no obligation to extend oral health benefits to adults (*Dental Care*, n.d.). At the time of writing (Spring 2021), the Virginia Smiles for Children program only provides adult Medicaid recipients in the Commonwealth with dental services when deemed medically necessary, as in an emergency. There is currently one notable exception for pregnant people, who receive full coverage for dental care while pregnant and for 60 days after the birth of their child (*Smiles for Children Dental Benefits Booklet*, n.d.). The Virginia Medicaid program is administered by the Department of Medical Assistance Services (DMAS).

An incredibly significant change during the 2020 Virginia legislative session was the passage of an adult dental benefit for Medicaid beneficiaries to the tune of $17.5 million

(Masters, 2020). The new coverage will provide comprehensive dental care to all Medicaid-insured adults within the state for the first time. Early estimates suggest up to 830,000 Virginians will gain dental insurance that makes necessary dental care accessible thanks to this change (F. Iuorno et al., personal communication, November 12, 2020). The new dental benefit will take effect on July 1st, 2021. One concern is that Virginia's Medicaid payment rates for dental services were last updated in 2007, and many dentists may not feel that the new benefits offer sufficient remuneration for their services (F. Iuorno et al., personal communication, November 12, 2020). Normal private practice dentists are under no obligation to accept Medicaid beneficiaries as patients, and this has the potential to weaken the impact of the new Medicaid dental benefit.

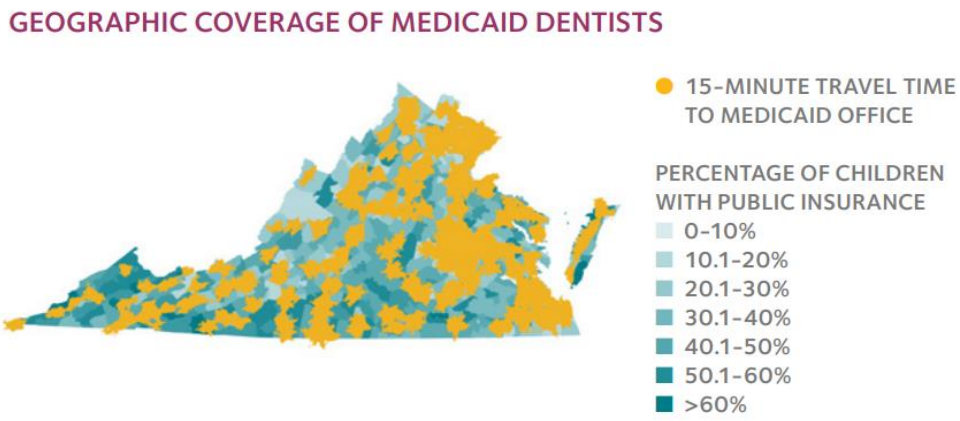

Figure 3: Patient access to dentists accepting Medicaid (American Dental Association, 2017)

Dentists' concerns about sufficient Medicaid payment rates are heightened by the circumstances of their trade. A dentist typically needs to repay the debt of their education and training, which can easily exceed a quarter-million dollars (*Erasing Dental Debt: From $200K to Zero in Less than Three Years*, n.d.) and often must invest approximately an additional half-million dollars to establish their own office (*The Real Cost of Owning a Dental Practice*, n.d.). While new doctors have often accrued comparable debt loads for their education, the national trends in medical practice increasingly sees doctors becoming employees of major hospitals (Henry, 2019), where they will not be responsible for purchasing costly medical machines from their practice earnings. Further, dentists in rural areas of Virginia typically make about $60,000 annually less than their urban counterparts in affluent areas like Arlington County (*Southwest Virginia Nonmetropolitan Area*, 2019; *Washington-Arlington-Alexandria, DC-VA-MD-WV*, 2019).

To compensate for the financial pressures the role of Federally Qualified Health Centers and Free Clinics become important factors in the state's oral health options. The Virginia Health Care Foundation funds 54 dental safety net clinics around the state (*Dental*, n.d.), a network that serves roughly 60,000 dental patients annually (O'Connor, 2018). These are staffed by a combination of volunteers and staff to provide dental care (*About Virginia's Free Clinics*, n.d.). At present, dental clinics are either uncompensated or paid on a sliding scale. There are also

more than 150 Federally Qualified Health Centers in the state, which serve more than 350,000 individuals' health needs (*About CHCs*, n.d.).

Impact on Society

The consequences for individuals with poor oral health are great. Bad teeth increase the risks of heart disease, endocarditis, diabetes, pneumonia, and premature birth (*Oral Health: A Window to Your Overall Health - Mayo Clinic*, 2019). Glycemic control for diabetics is also harder if they suffer from poor oral health (Preshaw et al., 2012). Individuals are more likely to miss work and school if they have poor oral health, and emergency dental care is estimated to cost adult Americans about 92.4 million hours of missed work annually (Kelekar, 2018). Even if adults don't miss work, poor teeth cause them to experience lower wages and employability; one prominent example of this discrimination came from President Trump's one-time Labor Secretary nominee, Andrew Puzder, who instructed restaurants not to hire cashiers "unless they have all their teeth" (Kantor & Medina, 2017).

Poor oral health also imposes costs on society as a whole. The ADA estimates that at least 79% of the oral health visits in American EDs could have been prevented, at a much lower cost, if a patient was able to access preventative dental care (Wall et al., 2014). An ED visit may cost between $400 to $1,500, compared to typically less than $200 for a preventative service in a dental office (Grover, 2014). Because Medicaid covers ED visits, including for oral health, this means that foregoing the provision of cheaper preventative care results in society eventually bearing the burden of the costly ED visit.

Inadequate preventative oral care had a role in the terrible cost of America's opioid epidemic, the salient national health crisis before COVID-19 arrived. Palliative care for dental pain, which is often the type of care administered in an ED environment, commonly involves the use of opioid painkillers. Dentists had historically been responsible for up to 15% of American opioid prescriptions, though the trade has sharply curtailed prescriptions as the true dangers have been realized (Somerman & Volkow, 2018). Virginia alone suffered 1,059 opioid deaths in 2018 (*Overdose Deaths – Opioid Data*, n.d.), and the opioid crisis imposed an estimated $1,624 per capita in economic burden for residents in 2015 (Brill & Ganz, 2018).

Policy Alternatives

There are several approaches this report considers for oral health disparities in rural and other disadvantaged populations to be approached. These were chosen based on a review of existing literature and discussions with Virginia experts. In each of the below subsections, I begin with a discussion of the possible policy and the form it might take in Virginia followed by a discussion of existing evidence.

Medicaid Adult Benefit (status quo)

The status quo for Virginia still sees an enormous shift taking place on July 1, 2021; this is somewhat unusual among policy analyses. Up to 830,000 Virginians are expected to gain

dental insurance on that date (F. Iuorno et al., personal communication, November 12, 2020). The new benefit will be comprehensive, including the provision of non-emergency preventative care for adults. This scenario assumes that no other changes occur, and omits consideration of any services provided before July 1, 2021. Payment rates remain frozen at about 63% of the dental reimbursement rates provided by private insurance, (*Medicaid Fee-for-Service (FFS) Reimbursement and Provider Participation for Dentists and Physicians in Every State*, 2017) and 33.8% of Virginia's active dentists continue to accept Medicaid.

Since no two states have the same Medicaid plan, and the coverage in each state may change over time, prior research can help estimate Virginia's forthcoming adult dental benefit's influence. National trends suggest that about one-quarter of persons receiving Medicaid dental coverage will end up actually taking advantage of the opportunity to get an annual dental visit (Yarbrough et al., 2016). Research based on survey data indicates that the likelihood of a Medicaid beneficiary getting an annual dental examination increases by 12.9 percentage points (33.9%) in states that added an adult benefit (Decker & Lipton, 2015). By another metric, there is a 14% drop in average dental ED use when a Medicaid dental benefit was offered to the adult population (Decker & Lipton, 2015).

It is also useful to examine what has happened when states cut Medicaid programs, as this sudden change allows us to contrast the true impact of the benefit without confounding variables from long-term population trends or unfamiliarity with new benefits. One such case occurred after the Great Recession when California was forced to cut their existing Medicaid dental benefit. Researchers found that California went from 42.4 oral health ED visits per 100,000 Medicaid beneficiaries to 56.1 ED visits; a 32.3% increase. The increase was particularly strong in urban areas and among the non-White population (Singhal et al., 2015). Older studies also identified notable increases in ED use after cutting a Medicaid benefit in other states; between 102% in Oregon (Wallace et al., 2011) and 21.8% in Maryland (Cohen et al., 1996).

Medicaid Rates

Medicaid rates for dental services were last updated for Virginia in 2007, and the dental community has expressed concern that these rates are too low. According to recent research from the ADA, reimbursement rates by Virginia Medicaid average about 63% of those of private insurance (*Medicaid Fee-for-Service (FFS) Reimbursement and Provider Participation for Dentists and Physicians in Every State*, 2017). During state fiscal year 2020, the state spent a total of about $184.4 million on dental services on all categories of Medicaid patients, with approximately $155.5 million spent on persons aged 18 or less and about $29 million on adults and seniors (*2020 Virginia Medicaid & CHIP Data Book*, 2020, p. 27). There were 400,340 patients ages 18 and under, and 93,570 adults treated in 2020; this averages to the state spending roughly $389 per Medicaid child and $308 per Medicaid adult on dental care annually (*2020 Virginia Medicaid & CHIP Data Book*, 2020, p. 93).

The degree to which payment would be increased is unclear. To adjust for inflation, a procedure that the state of Virginia would have paid $100 for in 2007 would be worth about $129 in 2021 dollars (*CPI Inflation Calculator*, n.d.); in other words, a nominal increase of at least 29%. However, an increase of 29% would place the payment ratio far above national averages of about 62% those of commercial rates (*Medicaid Fee-for-Service (FFS) Reimbursement and Provider Participation for Dentists and Physicians in Every State*, 2017). A more modest increase, of 10%, is proposed that would comfortably bring the Medicaid/private payer ratio above the 60-65% commercial rate threshold that evidence suggests is critical for dentist participation (Borchgrevink et al., 2008).

Since every state can adjust its Medicaid rates, there are unique opportunities created to estimate the influence of reimbursement rates. The rates paid by a state's Medicaid plan have a clear correlation with beneficiaries' access to care. In a national sample, one paper found a 10-percentage point increase in the ratio of Medicaid to private insurance payment was associated with a 2.5-percentage point increase of a dental visit (Decker & Lipton, 2015). Virginia's own most recent Medicaid dental rate increase, in 2007, offers an illustrative example: the utilization rates for children (the state did not provide a comprehensive adult benefit at the time) grew from 24% to 35% after a 28% increase in Medicaid dental rates and an education campaign about the new benefit (Borchgrevink et al., 2008).

Another study looked at the impact of Medicaid rates on children being able to access dental care. The researchers use Medicaid data from all 50 states and the District of Columbia in their study. A clear positive association was found, with no evidence of overuse in states with generous Medicaid payments. Increasing Medicaid rates in low-reimbursement states were predicted to increase access by between 2.3% and 11.3% depending on various other conditions (Chalmers & Compton, 2017).

Debt Forgiveness for New Dentists

Given the substantial cost to become a dentist, and even the notable expenses for dental hygiene training (*Program Costs*, n.d.), student debt may be a barrier for those who want to work in underserved communities. By subsidizing dentists to work in remote areas we can address the inequality of workforce and healthcare access directly. Based on recent state data, approximately 80 full-time-equivalent dentists are required to fully address all HPSA designations (Crowe, 2020). For this analysis, I consider a program to partially address this shortage by recruiting an additional five dentists per year to serve in an HPSA.

Some existing programs have brought dentists into service in underserved communities. Recent data provided by state personnel indicate that 24 dentists within the Commonwealth are under either the federal National Health Service Corps (NHSC) or recipients of the State Loan Repayment Program (Crowe, 2020). The NHSC pays dentists up to $50,000 in loan forgiveness for a two-year service commitment (*NHSC Loan Repayment Programs*, 2020), while

the State Loan Repayment Program can provide up to $140,000 for a four-year commitment to serve in an HPSA.

Establishing an amount for a possible grant is important. Although the existing debt forgiveness programs have some large figures attached to them, they are 'up to' amounts; the actual payments are smaller, sometimes much smaller. The Journal of Dental Education recently published the results of a survey sent to all pediatric dental residents in the country seeking their insight on the impact of grants to incentivize post-graduation plans. More than 40% of respondents indicated a preference to practice in a rural area and just 14% indicated no willingness to serve a rural population. However, about 1/3rd of these students lost interest in rural service upon learning that the average government-subsidized loan repayment was $30,000 annually. When researchers asked if an average annual repayment of $40,000-$60,000 were offered more than half of the respondents indicated an interest in serving in a rural area. We should be hesitant about response bias in a voluntary survey, but the results strongly suggest that existing loan forgiveness plans are not large enough. (Alrayyes et al., 2019)

Assessing the effectiveness of grant programs is important, but the evidence is surprisingly scant. A retrospective analysis of graduates from a Midwestern dental school, covering 30 years, concluded that dentists with a rural upbringing were six times more likely to choose to practice in a rural area (McFaland et al., 2012). Similar questions have been raised in medicine, with some researchers suggesting that incentives may not be effective in actually recruiting physicians, with program participants being those who would pursue rural practice regardless of supplementary incentives (Bärnighausen & Bloom, 2009). Even if financial incentive programs are causal in drawing a practitioner to a rural area, they appear unlikely to stay there. A retrospective study of physicians found that within 8 years less than 30% of those financially incentivized to rural practice remained there, and suggested that evidence from other nations imply that purely financial motives have limited effectiveness (Sempowski, 2004).

Midlevel Provider

To gain access to care in underserved areas the state could consider the creation of a mid-level provider class called a Dental Therapist (DT). A shorter, and less expensive, course of training creates a more diverse workforce, including career positions that are more accessible to those already living in underprivileged communities. The DT is a role that exists in about 50 foreign countries and has experienced limited introduction in the United States over the last 20 years. There are currently DT practice rules in more than a half-dozen states, though some of these have no active providers (Mantel, 2019).

There are limitations to the body of existing US evidence on DTs that merit caution. There are very limited numbers of practitioners to study; Maine, for example, has just recently gained its first active DT (*The East Coast's First Dental Therapist to Begin Practicing in Maine*, 2020) despite authorizing practice in 2014 (Mantel, 2019). Vermont will not be able to start training its first class of DTs until 2022 (*The East Coast's First Dental Therapist to Begin*

Practicing in Maine, 2020). Even the well-developed program in Minnesota has only about 90 practicing DTs (*2018 Dental Therapy in Minnesota, Issue Brief*, 2018), and an assessment of Michigan's first 32 DTs found there were too few to make a measurable impact on ED rates (*Early Impacts of Dental Therapists in Minnesota*, 2014). There are also extremely polarized politics around DTs, with Pew Research Center being vocal supporters and most dental trade bodies opposing the practice; it is, therefore, difficult to find objective information.

Technology for Supervision

Dental hygienists are a valuable resource in the healthcare workforce, yet current law in Virginia poses several barriers that inhibit their contributions. As previously discussed in the background section, the hygienist workforce is more concentrated in the health regions that are rural and underserved when contrasted with dentistry. Making better use of this workforce, while not obligating dentists with the considerable expense and time to reach distant populations, would help address concerns about transportation and care availability in rural communities. While interviews with hygienists identified several potential mid-level barriers, changing Virginia law around remote supervision appeared the most promising way to address geographic distribution and access concerns and offered the most promising array of political and implementation factors.

This policy approach would preserve established scope-of-practice and supervision rules, but change the application of remote supervision. Current Virginia law does permit remote supervision, but imposes two burdensome restrictions: a dentist must physically examine the patient within 90 days of a hygienist beginning treatment and the treatment must take place in one of a narrowly defined list of settings. Enabling the dentist to satisfy the 90 days examination via telemedicine and loosening the restrictions of site of service should open up the options for treating patients.

Prior research on trends across multiple states indicates that reducing autonomy restrictions on hygienists improves the patient capacity of dental offices (Buchmueller et al., 2014). A team of researchers has developed a scope of practice index for all 50 states and, after controlling for state-level factors, reported a "significant association" in their index between more autonomous dental hygienist scope of practice rules and the population's oral health (Langelier et al., 2016).

Existing research that specifically focused on teledentistry is limited in both its scope and relation to Virginia. Many of these studies occurred long ago when technology was in a more primitive state. More recent studies have focused on the developing world, and may not generalize well to the context of Virginia. Further, national familiarity with telemedicine and teledentistry have sharply changed since the COVID-19 pandemic arrived, which makes the context different from when any existing research occurred. (B. Crouch, personal communication, February 19, 2021; S. Pharr, personal communication, February 15, 2021; S. Raskin, personal communication, March 1, 2021)

Criteria

To assess each of the policy approaches outlined it is necessary to establish a framework to contrast their various advantages. Below are four evaluative criteria considered most impactful. For qualitative metrics (equity, political feasibility, and implementation feasibility) I assign values of High, Medium, or Low.

Equity

Weighted at 40%

Virginia Health Catalyst states, as part of their Strategic Vision, that their mission is to ensure "…all Virginians have equitable access to comprehensive health care that includes oral health (*Our Vision – Virginia Health Catalyst*, n.d.)." Additionally, this project has fundamentally focused on providing regions with underserved Medicaid populations, particularly rural areas, access to opportunities closer to other areas of the state. For this reason, the equity criteria received the highest weighting, at 40%.

Questions of equity depend on a certain level of normative judgment and are challenging to quantify. Those judged most equitable to Virginians on Medicaid will be described as high, while those seen as least equitable are low. In the context of this assessment geographic and economic equity for dental care are our interest; it is not my intention to imply that other categories of equality are unimportant, only that they are outside the scope of examination.

Cost Effectiveness

Weighted at 30%

The state of Virginia has only finite resources. An analysis therefore must consider the cost effectiveness for each possible intervention yet, as discussed in the background section, data resources for oral health are very challenging. Success is analyzed as the net present value (NPV, see Appendix A for details) of the policy option over the future ten years (2022-2032). The NPV is divided by the sum of the number of projected ED visits avoided over the same period among the Medicaid population. My assumptions on Virginia's population and Medicaid beneficiaries are described in Appendix B.

Political Feasibility

Weighted at 15%

Here I consider the potential of a policy approach to gain passage by the Virginia General Assembly. All of the discussed alternatives necessitate political involvement, either to update spending or adjust the Code of Virginia to change the regulations acted on by regulatory bodies. I consider the political palatability and the likely industry opposition that could be mobilized to lobby lawmakers to support or oppose a given alternative.

Implementation Feasibility

Weighted at 15%

In this criterion, I consider what would happen after a policy was politically approved. This principally takes into account the power of regulatory bodies, particularly DMAS and the Board of Health Professions, to shape the realization of the relevant legislation passed by the General Assembly. Key to this qualitative assessment is considering the composition of the implementing bodies and the expected resistance or opposition that 'street-level' realization of the idea may face. We also take into account the technical capabilities that staff would need to have to successfully implement a program.

Analysis of Alternatives

Table 1: Results Matrix

Results Matrix				
Weight	*40%*	*30%*	*15%*	*15%*
ALTERNATIVE	**Equity**	**Cost Effectiveness** **ED Visits Avoided**	**Political**	**Implementation**
Status Quo (Medicaid Adult Dental)	**Medium**	NPV Cost: $746.5 Million / EDs Avoided: 31,429 = **$23,751 per avoided ED**	**High**	**High**
Increase Medicaid Rates	**Medium**	NPV Cost: $426.9 Million / EDs Avoided: 12,866 **= $33,176 per avoided ED**	**Medium**	**High**
Debt Forgiveness	**Low**	NPV Cost: $4.36 Million / EDs Avoided: 2,533 **= $1,719 per avoided ED**	**Low**	**Medium**
Midlevel Provider	**High**	NPV Cost: $1.14 Million / EDs Avoided: 960 **= $1,185 per avoided ED**	**Low**	**Low**
Teledentistry	**High**	NPV Cost: $992,655 / EDs Avoided: 2,913 **= $341 per avoided ED**	**Medium**	**Medium**

Status Quo

In the baseline scenario, I predict changes to oral health trends after the adult Medicaid dental benefit becomes available later in 2021. This is referenced against a counterfactual scenario where Virginia does not add Medicaid dental benefits at any point through 2032.

Equity

Medium. By providing payment to dentists and clinics serving Medicaid beneficiaries the status quo sees a huge increase in the population with dental insurance across the state. This is an unquestionable advance, but it appears unlikely to drastically alter the inequality of provider access and distributions that is a challenge in rural areas of the state. The payments to federally

qualified health centers and other similar clinics do ensure that these facilities have a steady funding stream and remain operational in communities without other options.

Cost Effectiveness

A special 2019 report by the state identified that there had been 19,000 ED visits that year by 16,000 Medicaid beneficiaries (3.3% of Medicaid enrollees) for dental issues, or roughly 1 visit per 456 people for the 2019 state population (Kimsey, 2019a). I apply this ratio of Medicaid visits to population growth to project how many ED visits would have been expected to take place in a counterfactual Virginia without a Medicaid dental benefit. To estimate the impact of the new benefit I then apply the average 14% reduction in Medicaid ED use after Medicaid dental benefits calculated by Decker & Lipton (2015). I reduce the projected patterns of pre-benefit ED use by 14% every year, concluding that the state of Virginia will have about 193,000 ED visits between 2022-2032 under the status quo dental benefit; or about 31,400 less than the non-benefit counterfactual.

To calculate the status quo costs, I first start with DMAS' official estimations, which are available up until 2023. The estimates forecast that dental expenditures with the benefit will increase by 28.1% in 2022 and 35.3% in 2023 (*2020 Department of Medical Assistance Services Official Medicaid Forecast*, 2020); this stands in sharp contrast to the 2.2% per-year average increase in Virginia's dental Medicaid spending between 2014 and 2019 (*2018 Virginia Medicaid & CHIP Data Book*, 2018; *2020 Virginia Medicaid & CHIP Data Book*, 2020). I assume that the annual rise in expenditures will moderate as the adult dental benefit reaches normal population use in 2023 and apply national forecasts of costs increasing about 4.4% per year through 2028 (Keehan et al., 2020). I hold the 4.4% annual increase in expense constant until the end of projections in 2032.

In calculating a counterfactual scenario (no Medicaid benefit) I use a similar process. DMAS' projections for 2023 serendipitously considered the possibility of no Medicaid dental benefit, having been published before the 2020 special budget session was finalized (*2020 Department of Medical Assistance Services Official Medicaid Forecast*, 2020). I apply the same 4.4% annual expense growth to DMAS' last dental estimates to set projections through 2032. The alternate reality sees about 224,500 dental ED visits, applying an unchanging rate of Medicaid ED visits (1 in 456 residents per year) to the forecasted growth of the Virginia population.

Under these assumptions, a total of about 31,400 dental ED visits are avoided under the status quo between 2022 and 2032. The NPV of the adult dental benefit incurs a cost of $746.5 million more than estimated dental expenses without a benefit. The entire state Medicaid budget, exclusive of dental costs, is projected to have an NPV of $217 billion from 2022 to 2032. The addition of the dental benefit increases the NPV of the entire Medicaid budget by about 1.2% during the decade under analysis.

Political Feasibility

High. The policy status quo has already received political approval. It is unusual for established entitlement programs to be cut, though comments and actions during President Trump's term suggest a plausible future where Conservative political doctrine may pursue cuts aggressively. Virginia appears likely to continue its leftward political drift, which makes the success of the Conservative opposition to this benefit seem unlikely (Phillip & Simon, 2021).

Implementation Feasibility

High. This policy is already in the process of being implemented. While some unexpected setbacks can't be ruled out, I am not aware of concerning headwinds.

Increase Medicaid Rates

Under this alternative, I raise Medicaid's payment from an average of 63% (the status quo) to 73% of typical commercial insurance payments.

Equity

Medium. This will increase the number of Medicaid patients seen, but it has only a modest effect on incentivizing changes in geographic professional distribution. There will be increased funding provided to safety net clinics, but the workforce will probably remain concentrated in the affluent northeastern part of the state.

Cost Effectiveness

As of 2019, 1,925 dental providers were participating in the Virginia Smiles for Children Medicaid program (which also covers limited adult benefits). This represents 33.8% Medicaid participation by the total 5,692 active licensed dentists the state recorded in 2019 (Brown, 2019b). 31.7% of providers participated in 2015, the only other year for which published participation data was located (*Dentist Participation in Medicaid or CHIP*, 2015). I assume that the percentage of participating dentists is held constant at 33.8% through the end of projections without a change in payment rates.

The next question is to determine exactly what impact increasing the payment rate has. As noted earlier, Decker & Lipton (2015) determined an average 2.5 percentage point increase in dentist participation for every 10 percentage points of increased Medicaid payment to private insurance. This matches with the ADA's national projections of average participation rates (*Medicaid Fee-for-Service (FFS) Reimbursement and Provider Participation for Dentists and Physicians in Every State*, 2017). I use the projected Medicaid dental spending through 2032 (with the status quo adult dental benefit), applying an increase from Virginia's current 63% (*Medicaid Fee-for-Service (FFS) Reimbursement and Provider Participation for Dentists and Physicians in Every State*, 2017) to 73% of a full estimated commercial rate. At the same time, I raise dentist participation from 33.8% to 36.3% starting in 2022, and I hold this higher participation rate constant through 2032.

The increased spending over that decade incurs an NPV expense of about $3.1 billion. However, my assumptions also project that an additional 390,000 Medicaid patient visits are conducted (an average of 35,445 per year; see Appendix C for details). Assuming that 3.3% of these additional Medicaid patients are diverted from the ED, the state would avoid almost 13,000 ED admissions through 2032.

Political Success

Medium. An increase in rates is certain to receive support from the industry. However, the recent addition of the adult dental benefit required months of negotiation despite Democratic control in Richmond and wasn't finalized until late in 2020. In the current budget proposed for 2021 reimbursement rates for Medicaid home health care providers are increased, which implies some political will for similar approaches could be expected (Martz, 2021). Dental Medicaid rates remain near the national average at 63% of private reimbursement rates; this may make galvanizing political support challenging.

Implementation Success

High. Once the budget is approved by the General Assembly, this would be up to DMAS to implement. While a certain amount of bureaucratic inertia could occur, increasing funding does not fundamentally reshape how the agency works, or threaten the positions of any current stakeholders. While the Board is unlikely to have much influence to begin with, the dentists' support for such a measure makes any attempted implementation resistance from this agency seem implausible.

Debt Forgiveness for New Dentists

Annually offer 5 new graduates from dental school a fixed amount of debt forgiveness for a two-year term of service in an HPSA.

Equity

Low. A sizeable incentive will bring providers to underserved regions, but existing evidence indicates professionals rarely remain after their obligation concludes. Further, funds expended are a subsidy to a professional body who will recover their education debts even without assistance. There is a small risk that these subsidies will draw practitioners away from communities that might otherwise have required their services under unregulated market conditions.

Cost Effectiveness

Due to their obligation to underserved populations, I assume these dentists will see Medicaid patients at a minimum of three times the rate of the state average per-dentist calculated every year. I apply the same 3.3% ED reduction rate to the 76,760 patients seen by recruited dentists under my assumptions, which suggests about 2,530 dental ED visits are avoided through 2032.

The survey from Alrayyes et al. implies that a minimum of $40,000/year ($80,000 per 2-year participant) would be required to induce graduating dental students to consider rural service. In addition to this cost, I assume that the program will require the addition of 1 FTE position within the state government, valued at the state employee's median salary of $60,000, plus 30% for supplementary employment benefits, for the duration of the project. These decisions result in an NPV cost for this policy decision of $4.36 million.

Political Success

Medium. The dental industry would be likely to support subsidies, but this may face opposition from other medical and allied trades who are not going to be offered comparable benefits. While providing care for underprivileged communities may be a priority, the optics of granting support to otherwise well-paid professionals may prove challenging. On the other hand, Liberal political proposals have included the elimination of student debt and could align with this alternative.

Implementation Success

Medium. The most likely method for workforce development grants would be the Department of Health's State Office of Rural Health, which already administers the major state loan repayment programs for healthcare practitioners. However, the example of the Virginia Physician Loan Repayment Program offers a cautionary tale of what can befall a program – though authorized by legislation, state funding is not available to administer it (*Virginia Loan Repayment Programs – Health Equity*, n.d.).

Midlevel Provider

Equity

High. The entire purpose of the DT position, creating an independent midlevel provider, is to offer underserved areas a dental practitioner at a more affordable price. This new independent practitioner would primarily treat underserved populations without access to dentists. This change is addressed without a large subsidy to the dental industry or interference in the market economics of where dentists choose to practice.

Cost Effectiveness

An early study by the Minnesota government found that about 4% of patients seeing a DT for preventative care had visited an ED in the prior two years (*Early Impacts of Dental Therapists in Minnesota*, 2014, p. 19). This is marginally higher than the ED diversion rate I estimated for all Virginia dentists (3.3%), and a slight average increase seems appropriate if DTs apply their skills predominantly in underserved communities. I model that each DT sees 1,000 patients per year, as advocates have suggested in narrow case studies (Urahn et al., 2014). In line with commentary about existing programs, I further assume that at least 80% of DT caseload will come from patients on public insurance (Medicaid); the remaining 20% are omitted from ED diversion calculation.

Unlike other policies in this analysis, the DT approach requires significant time to reach fruition. Given a best-case scenario described by advocates, 2 years are assumed to find political approval (Gehshan, 2010), plus at least two years to establish a training program and at least a further two years to graduate the first class. Accounting for some hang-ups, I don't expect the first dental patients would be seen until approximately year 8. Accounting for this significant delay, I conclude the cumulative effort of a DT workforce would conduct about 30,000 dental examinations by 2032, 24,000 of whom are Medicaid recipients. If 4% of these projected Medicaid patients are diverted from the ED, the state will have avoided 960 Medicaid ED visits through 2032.

I model that the DT program costs to the state are modest. Grants or private funding would be used to inaugurate a training program, as other recent adopters appear to have accomplished; this cost is not considered in projections. I do assume that the state will need to provide tuition assistance to half of the new DTs, applying a low-range tuition of $50,000 to complete a two-year program. Due to the complexity of adding a new category of practitioner, I also allow for an additional FTE employee administrative position at the state employee median wage and compensation rate as soon as political approval is reached. Under these assumptions, the state incurs an NPV expense of $1.14 million for the cumulative administrative and educational support offered.

Political Success

Low. Despite some success in other states, DT proposals are hotly contested by dental lobbies across the country and may even face opposition from dental hygienists' professional bodies. There is no reason to believe that conditions would be different in Virginia soon, barring unexpected events.

Implementation Success

Low. There is a very long time between possible political success and the first DTs providing dental care, giving multiple opportunities for implementation to be derailed. The dominant role of dentists on the Board makes it likely that this position would automatically face headwinds even with political approval. Without active practitioners that would be harmed, it is plausible that even success in the early years of implementation could be sabotaged at a later time; the position might end up existing on paper only.

Teledentistry

Equity

High. This policy alternative changes the existing requirement that the supervising dentist is physically present with a patient. This policy approach does little to physically move dentists into new areas, but it would allow them to economically serve patients in communities through local hygienists that might not be large enough to support a conventional dental office.

Cost Effectiveness

Considering the evidence from Buchmueller et al. (2014) and Langelier et al. (2016), I conclude that removing this barrier would increase the capacity of dental teams to treat Medicaid beneficiaries. Shifting the 90-day physical examination to being, optionally, conducted remotely leads to an efficiency increase as dentists can conduct their required examinations without traveling to every possible Medicaid patient's location (B. Crouch, personal communication, February 19, 2021). I assume that this could increase by 1% the capacity of dentists to see Medicaid patients, steadily increasing to 2% capacity at the end of projections. Under a 3.3% ED diversion rate, I calculate that almost 3,000 ED visits would be avoided by this extra capacity through 2032.

To administer this policy, I assume that one FTE position will be necessary to support the rollout, billing system changes, and technical support. Further, I anticipate that the state will aid adoption by subsidizing equipment and software licensing fees for uncommon circumstances where offices do not already have the necessary equipment (B. Crouch, personal communication, March 17, 2021); one vendor cites a cost of $1,308 per year to service one site (*TeleDent by MouthWatch*, n.d.). I budget for the state subsiding the cost of 20 licenses annually for the duration of the program to aid implementation in safety-net settings. Administrative support and licensing fees for 10 years come in at the NPV expense of $992,665. Under my calculations, each avoided ED visit costs $340.82 NPV.

Political Success

Medium. An incremental change that explicitly preserves supervision of hygienists should face less opposition than a DT proposal, although hygienists interviewed suggest there may still be some hesitance. However, Virginia signed into law a definition for teledentistry in the 2020 session, a major step forward that implies some political appetite by legislators for the topic. National discussions about continuing post-pandemic telemedicine flexibilities in large healthcare programs, like Medicare, may capture more policymaker attention than experience implies.

Implementation Success

Medium. Existing efforts to launch teledentistry within the state (in the form of public health hygienists) have seen only limited adoption due to concerns about liability, payment, and unclear language. However, enacting clear language with the support of DMAS could help ameliorate the problems that have held back teledentistry so far.

Recommendation

As can be seen in Table 1, each potential course of action comes with tradeoffs. Increasing Medicaid rates by 10 percentage points should significantly improve dentists' work with the Medicaid population and sees the largest reduction in ED admissions of any new policy. However, it comes at a great expense and seems to have only a modest impact on access equity between different regions of the state. Grants requiring new dentists to serve for two years in an HPSA are reasonably cost effective if the modeled assumptions from this document are accurate, but this is a band-aid solution that does little to sustainably embed providers in communities without continuous government subsidies. Dental Therapists could provide a very cost effective and equitable solution, but the contentious debate and long implementation provide significant barriers that, at the present moment, appear to be insurmountable.

This leaves my recommended policy approach to complement the status quo: an incremental change to the existing midlevel provider regulations. By altering the 90-day rule to permit remote examination by the supervising dentist in more locations, the state gradually increases the effectiveness of an existing workforce over the coming decade. Further, Virginia positions itself to take advantage of emerging technologies and changing perspectives in the aftermath of COVID-19. My conclusion does have some risks in both political and implementation questions, including provider buy-in and the liability opinions of insurers. It is also worth noting that this is a policy alternative without a strong national track record that Virginia can learn from, and has a higher degree of uncertainty than the other policies examined; the technology is simply changing too rapidly.

Implementation of Recommendation

Implementing a change to allow Virginia dentists to satisfy the 90-day examination rule via teledentistry in more locations requires modification of the Code of Virginia, specifically §54.1-2722.F. This would be building on the proven success of remote examination with state-employed hygienists, as stipulated under §54.1-2722.E. Upon passage of a law adjusting the Code of Virginia, the Board of Dentistry is directed to promulgate the provisions within a set timeframe, typically 280 days.

Stakeholders

The first stakeholder group is practitioners who would make use of the new rules, namely dentists and dental hygienists. Both professionals have state-level organizations to promote individuals' interests; for dentists, this comes in the guise of the Virginia Dental Association, while hygienists are represented by the Virginia Dental Hygienists' Association. Both trades also have respective national representation through the American Dental Association and American Dental Hygienists Association.

The second stakeholder group is the state regulatory bodies that have the power to shape the implementation of authorizing legislation. DHP is the most vital, as it will be their Board that develops and enforces the standards of any remote examination program for both hygienists and their supervising dentists. Another agency that must be considered is DMAS, which will handle the funding and administration of payments for dental services rendered to Medicaid beneficiaries.

Stakeholder Perspectives

Practitioners have varied perspectives. Dental hygienists interviewed in the course of research were enthusiastic about the remote supervision idea, and even suggested it as an area for my investigation (S. Pharr, personal communication, February 15, 2021). At least before COVID-19, dentists were less enthusiastic about proposals to include remote supervision and examination options. The current limitations imposed by the 90-day rule were a compromise with dentists to enable some remote functioning of hygienists, but getting patients in for a physical examination has proven to be a serious barrier (S. Raskin, personal communication, March 1, 2021). However, the pressure of COVID-19, and Virginia's 2020 definition of teledentistry for the first time, suggest that there could be a shift in attitude that lessens traditional resistance.

As part of the Virginia Department of Health Professions, the Board's official mission is to "… ensure safe and competent patient care by licensing health professionals, enforcing standards of practice…" (*Homepage - Our Mission*, 2019). The board will set the standards it feels appropriate for teledentistry that permit the Board to uphold its mission to the public. Since a certain amount of subjectivity can be applied, we must bear in mind the composition of the Board: of its 10 members, seven are dentists (*§ 54.1-2702. Board; Membership; Terms of Office; Officers; Quorum*, n.d.). The board can therefore serve as a platform to amplify dentists'

perspectives about new legislation, including inhibiting the effectiveness of a remote examination rule that the trade finds objectionable.

The other governmental stakeholder to be considered during the implementation phase is DMAS. The agency will need to pay for services facilitated under remote examination for the practice to become regularly used. Some changes to billing structure would be required along with supporting documentation to process and pay for claims made under teledentistry examinations; the inclusion of an extra FTE position should help with any workload concerns that adapting to the new rules might entail.

Implementation Risks

The most consequential risk is non-participation by practitioners. A lack of clarity has inhibited the existing remote supervision rule in Virginia, and a similar pattern could befall this legislation during implementation. Working with industry stakeholders to ensure that ambiguous language is clarified by DMAS and the Board will be important. Support from dentists, both at large and the members of the Board will be important to avoid sabotaging the adoption of remote examinations.

This approach also depends on successfully employing technology in a new context. While this change appears to be an incremental one, which should work without significant modifications to existing systems, the potential for complications can't be ruled out. Consultations with outside vendors and experts may need to be factored in if the change is more complicated than appearances suggest.

Conclusion

The coming years should be exciting times for oral health advocates as the benefits of the new Medicaid adult dental benefit are realized. Based on the examination of a counterfactual to the status quo, Virginia made an excellent investment in the lives of Medicaid adults. Improving these adults' oral health will improve not just their individual lives, but the lives of their families and broader society.

Yet, there is an important distinction between having health insurance coverage and actually obtaining access to care. Obtaining access to care in rural areas of the state will remain challenging without a change to the status quo workforce trends. Expanded use of teledentistry supervision for the state's existing hygienist workforce offers the best tradeoffs of the options examined. The magnitude of the reduction in ED visits is smaller under my recommended action than some others, particularly the Medicaid rates increase, but it offers the best way to use Virginia's limited resources to build on the already great progress the state has made in the past year.

Appendix A: NPV and Cost Calculation

In determining future costs, I calculate the net present value (NPV) for the 10 years under consideration. Per public policy norms, I assume a 3% discount rate. The formula for NPV is expressed as $\mathrm{NPV} = \frac{R_t}{(1+i)^t}$; where *Rt* = a cash amount in a given year, *i* = the discount rate, and *t* = the time (year) of the cash amount.

Appendix B: Population and Medicaid Beneficiaries

I apply a constant rate of Virginia population growth based on estimates available for 2020-2030, concluding that an average of 80,268.5 people are added to the Virginia population annually (*Virginia Population Estimates*, 2020), with there being 9.7 million residents in 2032.

Trends in Virginia's Medicaid participation are challenging to analyze at the moment. The most recent year, 2020, was the first under the Affordable Care Act's Medicaid expansion and an average 17% of the population was enrolled in Medicaid, increasing from 14.7% in 2019 (*2020 Department of Medical Assistance Services Official Medicaid Forecast*, 2020). For the sake of estimation, I use the 17% population enrollment under the ACA expansion in 2020 as representative of likely future post-expansion trends and apply this to the growing Virginia population through 2032.

Year	Projection Year	Virginia Population	Medicaid Beneficiaries
2022	0	8,904,810	1,510,554
2023	1	8,985,079	1,524,171
2024	2	9,065,347	1,537,787
2025	3	9,145,616	1,551,403
2026	4	9,225,884	1,565,019
2027	5	9,306,153	1,578,636
2028	6	9,386,421	1,592,252
2029	7	9,466,690	1,605,868
2030	8	9,546,958	1,619,484
2031	9	9,627,227	1,633,101
2032	10	9,707,495	1,646,717

Table 2: Virginia Population & Medicaid Beneficiaries Through 2032

Appendix C: Medicaid Rates Calculations

I assume that the state's dental workforce will match projected national growth for the profession of 3% per decade (0.3% per year) in a linear trend through 2032 (*Quick Facts: Dentists*, 2020). The status quo model assumes that 33.8% of all providers continue to accept Medicaid patients without a change in rates. When rates are raised to 73% of commercial rates the number of participating dentists typically increases by 2.5 percentage points (Decker & Lipton, 2015).

Based on claims data from 2019, for every active licensed dentist in the state, there were approximately 224 Medicaid patients treated annually (Kimsey, 2019b). The number of Medicaid patients per-active dentist has risen from 2013 to 2019, from 191.1 to 224.4, with a particularly sharp increase (6.8%) observed between 2018 and 2019. The exact reason underlying this trend was unclear, but I factor in a modest 1% annual increase in Medicaid patients seen per-participating dentist to reflect improving technology or other factors that may be increasing office capacity.

Year	Medicaid Dentists @ 63%	Medicaid Dentists @ 73%	Increase In Patients @ 73%
2022	1,941	2,085	33,196
2023	1,947	2,091	33,628
2024	1,953	2,097	34,066
2025	1,959	2,104	34,510
2026	1,965	2,110	34,960
2027	1,971	2,116	35,415
2028	1,976	2,123	35,877
2029	1,982	2,129	36,344
2030	1,988	2,135	36,818
2031	1,994	2,142	37,298
2032	2,000	2,148	37,784

Table 3: Medicaid Workforce with Rates Change

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