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Case Studies of 6 Teledentistry Programs: Strategies to Increase Access to General and Specialty Dental Services

OHWRC
Oral Health Workforce Research Center

Center for Health Workforce Studies
School of Public Health
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Case Studies of 6 Teledentistry Programs: Strategies to Increase Access to General and Specialty Dental Services

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PREFACE

The Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) at the University at Albany's School of Public Health completed a research project to understand the barriers to and facilitators of the provision of teledentistry services to increase access to oral health services for underserved populations. The project was qualitative and used a case study methodology of 6 different organizations delivering general or specialty dental consultations via technology to patients. The study was conducted in the late spring of 2016.

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The mission of OHWRC is to provide accurate and policy-relevant research on the impact of the oral health workforce on oral health outcomes. The research conducted by OHWRC informs strategies designed to increase access to oral health services for vulnerable populations. OHWRC is based at CHWS at the School of Public Health, University at Albany, State University of New York (SUNY), and is the only research center uniquely focused on the oral health workforce.

The views expressed in this report are those of OHWRC and do not necessarily represent positions or policies of the School of Public Health, University at Albany, or SUNY.

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Special appreciation is extended to the leadership and staff of the 6 organizations that hosted these case studies. The authors are indebted to the executive and administrative staff, oral health professionals, social support workers, case managers and patient navigators, information technology staff, and others who gave generously of their time and provided significant insight into the discussion of the barriers to and facilitators of oral health service delivery through teledentistry.

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BACKGROUND

Concerns about limited access to oral health services for underserved populations are prompting providers to adopt innovative service delivery models to meet the needs of those with access barriers. While access to health care services for the underserved has improved in recent years, the availability of oral health services continues to be limited for many, especially for the rural poor.

Populations living in rural areas experience diverse challenges to obtaining oral health services, including higher rates of chronic disease, higher percentages of elderly people, limited availability of health and oral health workforce and provider organizations, higher rates of unemployment, underemployment and poverty, lower rates of dental insurance, and greater dependence on public insurance coverage than those in more densely populated areas. Lower levels of community water fluoridation and greater dependence on private water supplies in rural areas affect oral health outcomes over the long term. Personal barriers include a lack of public transportation or reliable private transportation to access distant oral health services. As a result of these and other barriers, rural populations exhibit higher rates of oral disease, lower rates of oral health services utilization, higher rates of inappropriate emergency department usage for dental complaints, and poorer oral health outcomes generally than other population groups. Strategies to increase access to and utilization of oral health services must be tailored to these special characteristics of rurality.

Although dental services are now increasingly provided in public health settings in rural areas, including federally qualified health centers (FQHCs), access to services in the safety net is constrained by limited resources and capacity, including a limited supply of clinical providers. The use of teledentistry as a means to improve access to oral health services in areas with inadequate availability of general and specialty dental care is emerging as a practical solution, especially for treatment planning and specialty consultations. A review of the scientific literature on teledentistry found it to be a promising and effective strategy for increasing access to services in both rural and urban areas.

Informants observed that the use of telehealth applications is exploding as recognition of their promise as essential tools in efforts to provide value-based care for patients increases.

Description of Teledentistry Modalities

Teledentistry services are designed differently by programs to meet the specific needs of the populations of concern but mainly include:

- Face-to-face consultations in real time by video conference between a general or specialty dentist and a patient located in a separate, distant location. The patient is generally joined by an oral health professional who can present the patient's history and complaint. The dentist is located at the "hub" location and interfaces with a dental hygienist and a patient at a "spoke" location to determine diagnosis and discuss treatment planning.

- Store-and-forward consultations between a general and specialty dentist or between a dentist and a dental hygienist in which images and records are obtained from the patient and sent to the dental professional for review and planning at a later time. The dentist forms a treatment plan for the dental hygienist to manage the patient in the community and/or refer the patient for further treatment services.

- Remote monitoring of patients, which is mainly a modality used in telehealth activities, in which electronic health devices collect data in real time that is transmitted to health care providers at a distant location for review and action as needed. Monitoring of patients' daily blood glucose is an example of this application.

- Teledentistry is also an educational tool for dental professionals and others in dental schools and residency programs and in the clinics where it is used.

METHODS

The research was qualitative, using a collective case study methodology to describe delivery of teledentistry services by 6 provider organizations. The goals of the project were to:

- Describe contextual conditions affecting the decision by a provider organization to offer teledentistry services
- Understand environmental facilitators for and barriers to implementing teledentistry services
- Learn about the technology necessary to provide teledentistry
- Describe provider attitudes towards and satisfaction with services delivered through remote communication technologies

Organizations were selected for the case studies based on a history of using teledentistry for delivering oral health services and for having established strategies to sustain teledentistry services. A concerted effort was made to identify teledentistry provider organizations with diverse organizational structures to demonstrate the applicability of teledentistry to a variety of service delivery models and for various population groups. Organizations selected for the project included:

- An independent dental hygiene practice
- A nonprofit staff model group dental practice
- A dental service organization/insurer
- A dental residency program
- A district health department
- A FQHC

The case studies were conducted in person and by telephone. Research staff visited provider organizations and, when possible, a spoke location where teledentistry services were offered, including a school and a general dental clinic. A variety of executive, administrative, and clinical staff were interviewed. While a standard interview protocol was provided to all case study participants, the interviews for the case studies were largely unstructured to allow informants to provide information pertinent to their roles in teledentistry service provision.

The technical report for this study provides further elaboration of each of the common themes developed during the case study process. Appendix A contains summaries of the individual case studies conducted for this project. A copy of the interview protocol is available in Appendix B. Appendix C contains a table describing regulation of teledentistry by state that was compiled from a comprehensive report published by the Center for Connected Health Policy, the federally designated National Telehealth Policy Resource Center.

CASE STUDY PARTICIPANTS

The 6 organizations that participated in the case studies were:

- *Apple Tree Dental* in Minneapolis, MN
- *Finger Lakes Community Health* in Penn Yann, NY
- *NYU Lutheran Dental, NYU Langone Health System* in Brooklyn, NY
- *Polk County Teledentistry* in Independence and Salem, OR
- *Senior Mobile Dental* in Colorado Springs, CO
- *Southeast Health District* in Waycross, GA

FINDINGS

Case study participants identified the benefits of teledentistry, noting that the modality provided opportunities to assess the oral health status of patients, to accomplish risk assessment and determine treatment needs, to educate patients about treatment options, and to effect appropriate referrals. The findings from the case studies are summarized in the following common themes developed from the interviews conducted for the project.

- **Teledentistry is a relevant and appropriate strategy for linking patients with clinical providers who are not otherwise easily accessed.**
- **The effectiveness of teledentistry services is predicated on significant preliminary planning processes and focused training for providers prior to implementation of a teledentistry program.**
- **Infrastructure requirements vary by location, but certain basic technology is essential to provide high-quality services.**
- **Teledentistry services are useful for delivering both primary and specialty dental consultations.**
- **Teledentistry offers the opportunity to provide patient-centered services coordinated by an inclusive team of clinical providers and other organizational staff.**
- **Teledentistry is a cost-effective modality for both patients and providers, but finding sustainable funding to provide the services is challenging.**
- **Teledentistry is an effective modality for providing continuing education and training for practicing clinicians, for dental students and dental residents, and for other members of the oral health team.**
- **Evaluations of the effectiveness of teledentistry programs are lacking. There are many outcomes of interest that would benefit from further study.**

DISCUSSION

Teledentistry is an emerging modality for delivering oral health services to populations with significant difficulty finding services because of geography or other factors that limit the accessibility or availability of dental care. Case study participants commented on the efficacy of teledentistry for patients, especially on the advantages for triaging patients to the most appropriate level of care. A percentage of patients who were assessed through teledentistry consults were able to remain in their local communities for basic oral health services and for care management. As a result, scarce dental resources in communities were appropriately reserved for patients in need of more extensive treatment or surgical services or for those assessed at high risk for disease. In addition, informants to the case studies remarked that patients and providers expressed satisfaction with the quality of services and the outcomes from teledentistry consultations. Patients experienced shorter wait times to obtain consultation services, and providers found the modality efficient, timely, and cost effective.

While there appeared to be many tangible benefits from the use of teledentistry, case study participants also observed intangible positive effects on team building within an organization. Maintaining teledentistry program services required the ongoing participation of a broad range of clinicians and support staff in sponsoring organizations focused on patient-centered care. In addition, case study participants observed the educational benefits of teledentistry not only for patients but also for primary care providers, general dentists, and other clinicians who learned from case discussions with specialty providers about mutual patients through teledentistry.

Case study participants described teledentistry as a useful alternative modality for providing services to populations who lacked access to oral health care in their local communities. The convenient aspects of teledentistry for both patients and providers contributed to service value and increased patient compliance with appointments. Teledentistry programs also provided access to important specialty services that were difficult to obtain, especially in areas where those services were available only at considerable distance from the patient's home community.

However, informants discussed regulatory and reimbursement barriers that affected providers' engagement with teledentistry, including scope-of-practice requirements that limited the practice of dental hygiene in remote locations, inadequate funding for teledentistry services, and regulations that inhibited their provision. Adequate reimbursement for the cost of delivering teledentistry services was a concern among case study participants, especially since costs to deliver those services accrue at both the hub and spoke locations. Rising interest in the use of teledentistry to address unmet need in certain populations has resulted in legislative action in several states to define parameters for the services and to provide funding for its use.

This study used qualitative methods to describe teledentistry programs in organizations providing oral health services to diverse populations, but was unable to find quantitative data to support the efficacy of such programs. Further quantitative research is needed to document the impact of teledentistry on cost of care, access to services, and patients' oral health outcomes. Several demonstration projects across the US promise to enhance knowledge of the efficacy and utility of the modality in the coming years. Data generated by existing programs and from proposed demonstration projects should provide better documentation to describe the benefits and impacts of teledentistry services on patients' oral health outcomes.

Technical Report

BACKGROUND

Concerns about limited access to oral health services for underserved populations are prompting providers to adopt innovative service delivery models to meet the needs of those with access barriers. While access to health care services for the underserved has improved in recent years, the availability of oral health services continues to be limited for many, especially for the rural poor.

Populations living in rural areas experience diverse challenges to obtaining oral health services, including higher rates of chronic disease, higher percentages of elderly people, limited availability of health and oral health workforce and provider organizations, higher rates of unemployment, underemployment and poverty, lower rates of dental insurance, and greater dependence on public insurance coverage than those in more densely populated areas.[1-3] Lower levels of community water fluoridation and greater dependence on private water supplies in rural areas affect oral health outcomes over the long term. Personal barriers include a lack of public transportation or reliable private transportation to access distant oral health services. As a result of these and other barriers, rural populations exhibit higher rates of oral disease, lower rates of oral health services utilization, higher rates of inappropriate emergency department usage for dental complaints, and poorer oral health outcomes generally than other population groups. Strategies to increase access to and utilization of oral health services must be tailored to these special characteristics of rurality.[1]

Although dental services are now increasingly provided in public health settings in rural areas, including federally qualified health centers (FQHCs), access to services in the safety net is constrained by limited resources and capacity, including a limited supply of clinical providers. The use of teledentistry as a means to improve access to oral health services in areas with inadequate availability of general and specialty dental care is emerging as a practical solution, especially for treatment planning and specialty consultations. A review of the scientific literature on teledentistry found it to be a promising and effective strategy for increasing access to services in both rural and urban areas.[4]

Informants observed that the use of telehealth applications is exploding as recognition of their promise as essential tools in efforts to provide value-based care for patients increases.

FACILITATORS OF TELEHEALTH AND TELEDENTISTRY

Developments in communication technology now enable health care and oral health care providers to more conveniently consult with patients in distant locations. Federal mandates that require meaningful use of electronic health records have increased the extent of communication infrastructure and the proliferation of capable technology to enable interconnectivity and, as a result, telehealth and teledentistry services.

Wireless technology, cloud computing, standardized protocols for digital imaging and communication in medicine (DICOM), capable picture archiving and communication systems (PACs), and portable medical and dental equipment, including small intraoral cameras and lightweight portable imaging devices, reduce the complexity of obtaining and transmitting health and oral health information and diagnostic x-rays across distances. High-capacity broadband networks relay clear diagnostic images and patients' clinical records, providing an opportunity for patients and providers to interface in real time by video technology. Secure health information is now more easily and safely transmitted across local, regional, and statewide information exchanges, allowing for improved communication between providers and patients.

"Teledentistry improves the experience of oral health care on many levels, especially for rural populations or people with special needs, including seniors. Some of the cynicism about teledentistry is changing with the development of capable technology.

For many years, policymakers and others spoke of the 'dental home' as if it were an explicit brick-and-mortar location. Virtual encounters make it possible to establish a dental home from wherever the patient is located, especially when the care is continuous and comprehensive. Oral health can be achieved in many different settings and enabled through care coordination by the dental home provider."

—A case study informant

Telehealth has been described as a "disruptive" innovation in health care because it has the potential to impact service delivery design in many areas, particularly in specialty care.[5] Delivering services through telehealth modalities appears to expand both system and workforce capacity for increased convenience for patients and improved efficiency for providers. Use of telehealth modalities promotes risk assessment, early diagnosis and intervention, and the opportunity for continuous monitoring of patients in their home communities.

Programs in tele-endocrinology, tele–mental health, tele-neurology, and other specialty areas of medicine have proliferated across the country. Neonatal

units and intensive care units are using telehealth technologies to consistently monitor critical patients. Home health agencies are using remote monitoring devices to ascertain and address changes in a home care patient's health status, especially among patients with chronic diseases, before acute interventions are necessary. Teledentistry is an evolving application of telehealth technology that is demonstrating promising results for patients.

BENEFITS OF TELEDENTISTRY

Telehealth modalities provide a cost-effective solution to in-person care, permitting bidirectional communication between a clinical provider and a patient at a distant location. In places where teledentistry has been implemented, it is proving especially useful for efficiently triaging patients to the most appropriate level of oral health services.

Low-risk patients are able to receive preventive services, basic treatment services, and maintenance in their home communities while scarce dental resources are reserved for patients needing specialized expertise and more complex services. Effective use of dental team members in patient case management at separate access points or endpoints provides an opportunity for intervention in and monitoring of oral disease to improve oral health outcomes over the long term.

Store-and-forward consultations permit the general dentist or specialist to develop treatment plans at times convenient to the dentist; real-time consultations allow for optimal resource management, including immediate treatment planning, and also enable the patient and provider to establish a relationship.

Other probable outcomes from the use of teledentistry include cost avoidance for patients and increased clinical and appointment efficiencies for providers.[6] Patients receive consultative services that might otherwise have required leave time from work and burdensome travel expenses. A study of a teledentistry demonstration program in Minnesota found that participants traveled, on average, between 12 and 13 miles to complete a teledentistry visit with a specialist in contrast to an average 300-mile trip to see that specialist at a university's dental school. In addition, both providers and patients expressed satisfaction with the quality of the care provided and received in the teledentistry visit.[7] Teledentistry is perhaps particularly useful for children and seniors because their ability to access oral health services is compromised by their dependence on transportation to providers by others. Providing teledentistry services in schools, preschool programs, and nursing homes mitigates this barrier to care.

"By triaging patients to appropriate levels of preventive care in their communities, scarce dental resources are more suitably engaged to provide treatment services. Approximately 30% of the children in this teledentistry program in a Head Start setting need follow-up treatment services by a dentist. Teledentistry enables the dental hygienist to provide necessary preventive services for the other 70% at the Head Start location."

—A case study informant

Another intangible advantage of teledentistry is increased access to and reduced wait times for appointments with dental or medical specialists. In one teledentistry program, wait times for children to receive a consultation and surgery services from a pediatric dentist were reduced from 9 months to 3 to 4 weeks using teledentistry (see Finger Lakes Community Health in Appendix A).

A study of the impact and cost effectiveness of teledentistry in Georgia found that children in the teledentistry program were less anxious when consultation services were provided in a trusted environment such as a home school or primary care setting rather than in a distant and unfamiliar dental office or specialty dental clinic.[2] In addition, providers benefited from improved appointment compliance related to the increased convenience and local availability of services for patients. In the opinion of many of the informants to this study, teledentistry services initiate a continuum of care that is appropriate, of high quality, cost effective, and value based. Teledentistry has the potential to enable early diagnosis, enhance the timeliness of treatment, and increase utilization of services and overall access to care and provides a method to initiate the establishment of a "dental home" for patients.[8]

"The teledentistry program is a non-threatening introduction to dentistry; children like seeing their teeth through the camera and the program gives them a concept of preventive care and healthy behaviors."

—A case study informant

DESCRIPTION OF TELEDENTISTRY MODALITIES

Teledentistry services are designed differently by programs to meet the specific needs of the populations of concern but mainly include:

- Face-to-face consultations in real time by video conference between a general or specialty dentist and a patient located in a separate, distant location. The patient is generally joined by an oral health professional who can present the patient's history and complaint. The dentist is located at the "hub" location and interfaces with a dental hygienist and a patient at a "spoke" location to determine diagnosis and discuss treatment planning.

- Store-and-forward consultations between a general and specialty dentist or between a dentist and a dental hygienist in which images and records are obtained from the patient and sent to the dental professional for review and planning at a later time. The dentist forms a treatment plan for the dental hygienist to manage the patient in the community and/or refer the patient for further treatment services.

- Remote monitoring of patients, which is mainly a modality used in telehealth activities, in which electronic health devices collect data in real time that is transmitted to health care providers at a distant location for review and action as needed. Monitoring of patients' daily blood glucose is an example of this application.

- Teledentistry is also an educational tool for dental professionals and others in dental schools and residency programs and in the clinics where it is used.

THE HISTORY AND CURRENT USE OF TELEDENTISTRY SERVICES

Although teledentistry was first used in the US Army's Total Dental Access Project at Fort Gordon, which began in 1974,[9] it has yet to be widely adopted in states due to various barriers, including cost, limited information infrastructure in some areas, scope-of-practice barriers for dental auxiliaries, limitations on reimbursement, and a lack of validation of outcomes. The absence of peer-reviewed literature supporting the economic benefits of teledentistry has been identified as a barrier to obtaining sustainable funding for teledentistry programs.[5]

Over several years, the US Health Resources and Services Administration and the US Department of Agriculture have provided grant funding to place telehealth and teledentistry equipment in key locations across the US to enable service provision.[10] However, applications using technology to provide health services between a clinician at a hub location and a patient at a spoke location are more common in health care than in oral health care. Teledentistry appears to be emerging more slowly than other telehealth applications, perhaps because of the procedure-oriented nature of dentistry. However, the benefits of providing preventive services in the patient's community and of managing care at the local level through teledentistry consultations are now more widely recognized.

Several successful models of care delivery using teledentistry applications have emerged in recent years. The dental health aide therapist (DHAT) workforce model used in tribal communities throughout Alaska depends heavily on telecommunication and teleconsultation between dentists, dental therapists, and patients.[9] This model has enabled oral health care services to be more routinely available in remote Alaskan villages that were previously visited only occasionally by dental health professionals.

"The value of teledentistry is that you are able to get care to those who can't get care, and by doing so, you avoid the results of dental neglect. The modality is about increasing access; it is apparent that this is important on many levels. Some patients haven't seen a dentist in 20 or 30 years, and all wish they had been seen sooner because they might have avoided losing teeth and suffering pain, and would have had a better overall oral health outcome.

Teledentistry also reduces some of the cultural differences that keep patients out of private practices. It removes patients from demanding financial decisions that might be pressed upon them for treatment services that are not completely necessary in the elderly population."

—A case study informant

In California, the Virtual Dental Home, conceived and implemented by Dr. Paul Glassman, was recently further enabled through state legislation that now allows reimbursement for teledentistry services.[11] Registered dental hygienists in alternative practice in the state are now also permitted to provide interim therapeutic restorations to patients in the Virtual Dental Home. This teledentistry model, which is used in community settings such as schools and nursing homes in California, is being replicated in several states, including Hawaii, Ohio, Colorado, and Oregon. The state of Hawaii is conducting a teledentistry pilot program based on the model to address the uneven distribution of oral health resources and workforce and the lack of community water fluoridation across the Hawaiian Islands.[12] A consortium in Oregon is using the Virtual Dental Home as a template for delivering teledentistry services to school children in a rural area in the northwest part of the state (See Polk County Teledentistry in Appendix A).

Apple Tree Dental in Minnesota (see Appendix A) provides an example of a large dental group practice serving mainly underserved populations that effectively used teledentistry modalities to increase access to oral health services, especially for children and seniors. The teledentistry model at Apple Tree linked the special care dental clinics in the practice to mobile dental clinics in schools and other community settings, including assisted living and nursing facilities. The services included face-to-face consultation and examination in real time as well as store-and-forward applications of teledentistry.[13] Apple Tree provided teledentistry services beginning in 2003, but stopped in 2010 after a change in state Medicaid regulations that required all dental services to be conducted in-person. In January 2016, the State of Minnesota passed a statute enabling telehealth services, including teledentistry, without a face-to-face encounter. Apple Tree expects to resume teledentistry services as soon as new regulations are promulgated.

A demonstration project in Arizona studied the application of teledentistry-assisted services by affiliated-practice dental hygienists providing oral health services to children in 13 different locations, including Head Start settings in both metropolitan and remote areas of the state.[9] The project found that teledentistry applications enabled a mid-level practice model for the dental hygienists, who provided preventive and diagnostic oral health services in local areas in consultation with remote dentists. The model digitally linked the oral health care team in different locations to address the service needs of the population in the program.

PROJECT DESCRIPTION

Literature on teledentistry applications is limited, and data on their impact on patients' service utilization rates and oral health outcomes is sparse. To understand the utility of teledentistry as a strategy to increase access to oral health services, researchers at the Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS), University at Albany, New York, School of Public Health, conducted 6 case studies of provider organizations using teledentistry across the US. The case studies were conducted during the spring and summer of 2016. The project work was funded through a cooperative agreement with the Health Resources and Services Administration.

CASE STUDY PARTICIPANTS

The 6 organizations that participated in the case studies were:

- *Apple Tree Dental* in Minneapolis, MN
- *Finger Lakes Community Health* in Penn Yann, NY
- *NYU Lutheran Dental, NYU Langone Health System* in Brooklyn, NY
- *Polk County Teledentistry* in Independence and Salem, OR
- *Senior Mobile Dental* in Colorado Springs, CO
- *Southeast Health District* in Waycross, GA

METHODS

The research was qualitative, using a collective case study methodology to describe delivery of teledentistry services by 6 provider organizations. The goals of the project were to:

- Describe contextual conditions affecting the decision by a provider organization to offer teledentistry services
- Understand environmental facilitators for and barriers to implementing teledentistry services
- Learn about the technology necessary to provide teledentistry
- Describe provider attitudes towards and satisfaction with services delivered through remote communication technologies

Organizations were selected for the case studies based on a history of using teledentistry for delivering oral health services and for having established strategies to sustain teledentistry services. A concerted effort was made to identify teledentistry provider organizations with diverse organizational structures to demonstrate the applicability of teledentistry to a variety of service delivery models and for various population groups. Organizations selected for the project included:

- An independent dental hygiene practice
- A nonprofit staff model group dental practice
- A dental service organization/insurer
- A dental residency program
- A district health department
- A FQHC

The case studies were conducted in person and by telephone. Research staff visited provider organizations and, when possible, a spoke location where teledentistry services were offered, including a school and a general dental clinic. A variety of executive, administrative, and clinical staff were interviewed. While a standard interview protocol was provided to all case study participants, the interviews for the case studies were largely unstructured to allow informants to provide information pertinent to their roles in teledentistry service provision.

This report provides a summary paragraph for each of the common themes developed during the case study process. Appendix A contains summaries of the individual case studies conducted for this project. A copy of the interview protocol is available in Appendix B. Appendix C contains a table describing regulation of teledentistry by state that was compiled from a comprehensive report published by the Center for Connected Health Policy, the federally designated National Telehealth Policy Resource Center.[14]

FINDINGS

The findings from the case studies are summarized in the following common themes developed from the interviews conducted for the project:

- **Teledentistry is a relevant and appropriate strategy for linking patients with clinical providers who are not otherwise easily accessed.**
- **The effectiveness of teledentistry services is predicated on significant preliminary planning processes and focused training for providers prior to implementation of a teledentistry program.**
- **Infrastructure requirements vary by location, but certain basic technology is essential to provide high-quality services.**
- **Teledentistry services are useful for delivering both primary and specialty dental consultations.**
- **Teledentistry offers the opportunity to provide patient-centered services coordinated by an inclusive team of clinical providers and other organizational staff.**
- **Teledentistry is a cost-effective modality for both patients and providers, but finding sustainable funding to provide the services is challenging.**
- **Teledentistry is an effective modality for providing continuing education and training for practicing clinicians, for dental students and dental residents, and for other members of the oral health team.**
- **Evaluations of the effectiveness of teledentistry programs are lacking. There are many outcomes of interest that would benefit from further study.**

ELABORATION OF COMMON THEMES

The following provides background information that supported the development of each of the findings listed above. Comments attributed to case study participants in these summaries and throughout this report are paraphrased from remarks made during the case study visits.

Teledentistry is a relevant and appropriate strategy for linking patients with clinical providers who are not otherwise easily accessed.

Case study participants described both the relevance and value of teledentistry in terms of their patient populations. Common motivating factors for providing teledentistry services were the multiple barriers for underserved patient populations to access oral health providers. These included geographic and socioeconomic factors that prevented patients from seeing general dentists or specialists to address oral disease. Using capable technology to provide access was described as a logical strategy to link patients to necessary services.

In all case study locations, patients of concern were primarily rural populations. According to case study participants, people in rural areas are often poorer than urban counterparts and more likely to be publicly insured. Hourly employment is especially common in rural areas where there are few large industrial employers. Obtaining leave time from hourly jobs to obtain oral health services during the work week, especially when lengthy travel is required to access those services, was described as economically burdensome. Patients without leave time benefits forgo pay when not present at work. In addition, in many of the catchment areas served by case study organizations, there were few private dental practices and most were inaccessible to patients insured by state Medicaid programs.

Case study participants commented that the absence of public transportation systems in rural areas exacerbated difficulties with personal transportation in those areas. Patients' automobiles were described by informants as often unreliable for long-distance travel, the cost of gas for long trips was not affordable, or private transportation was simply not available. Teledentistry services were described as convenient, safe, of high quality, and cost effective for patients and particularly useful under these circumstances.

Children and seniors in both urban and rural areas, especially those confined to skilled nursing facilities, were target populations in several of the teledentistry programs that participated in the case studies. One case study participant described the complexity involved in transporting a senior from a nursing home to a private dental practice. The patient must be accompanied to the appointment by a caregiver, which necessitates time from work for a family member or time away from the facility for a staff member. The

patient must then be navigated through often inaccessible offices, wait with other patients to be called to an operatory, and then be transferred to a dental chair for evaluation and treatment planning. In cases where follow-up treatment services are required, this expensive, lengthy, and inconvenient process must be repeated until treatment is completed. Teledentistry services enable a patient to remain in the nursing home for screening and assessment services. Once treatment planning is completed, only those who need further care are transported for reparative treatment services. In some places, the teledentistry provider also offered accompanying mobile dental services such that a dentist would travel to the nursing home to provide required treatment services after completion of the preliminary virtual teledentistry visit. Providing these services through teledentistry maximized efficiencies and increased capacity for the dentist and the dental team to provide clinical services to more patients. It also allowed the dental provider to serve multiple patients in the nursing home in an efficiently scheduled day.

Several informants commented that children and seniors were less anxious and generally more comfortable with receiving dental consultation services when these services were provided in a setting such as a school or a nursing home where familiar support staff were available to the patient. When discussing the advantages of teledentistry, consulting dentists commented that many patients were more at ease in their conversations when they video conferenced from a neutral environment. One pediatric dentist commented that the virtual consultation provided him with the opportunity to evaluate the child's behavior in customary surroundings in order to better plan for behavior management when the child ultimately presented for surgery at the care facility.

> "Teledentistry is an especially promising modality to deliver services to people with developmental disabilities or special needs, nursing home residents, people in rural areas or inner cities, and children in schools and in preschool programs. The benefits of teledentistry are most evident when one considers the beneficial outcomes from the services, including shorter time frames to obtain specialty consultations, higher treatment completion rates, lower no-show rates for appointments, and improved workflow efficiencies for patients, providers, and support staff."
>
> *—A case study informant*

The effectiveness of teledentistry services is predicated on significant preliminary planning processes and focused training for providers prior to implementation of a teledentistry program.

Informants to the case studies indicated that the extensive planning to provide telehealth/ teledentistry services must begin with identification of the special health care needs in the local population that are most difficult to address. Finger Lakes Community Health is an example of a provider organization with highly developed telehealth and teledentistry programs that were specifically designed to meet the needs of their target populations.

The health center has 8 primary care clinics and 7 dental clinics providing services to more than 25,000 patients annually. The original mission of the organization was to improve migrant health, but over time, that mission was extended to include the larger community in the mostly rural regions of New York where the health center operates clinics. High rates of diabetes in the population led to the development of a diabetic retinopathy telehealth service program in collaboration with an ophthalmologist in California. The shortage of mental health professionals both locally and in the health center and the need from so many patients for counseling services led to the use of telecommunication for behavioral health counseling and medication management in collaboration with clinical providers both in house and in Syracuse, New York. The need for specialty oral health services under anesthesia among the pediatric patient community led to a teledentistry program in collaboration with a pediatric dental specialist in Rochester, New York. The teledentistry program is now the largest-volume telehealth service provided by the health center.

Case study participants discussed the importance of a rigorous preliminary planning process to successfully implement teledentistry services once a need has been identified and to provide a seamless patient care experience. As mentioned, Finger Lakes Community Health provides a broad range of telehealth services, including teledentistry services. Each telehealth program in that organization was separately and explicitly planned by a team of clinicians, patient support staff, and administrative and executive staff before piloting and final implementation. The planning committees considered every detail of the care delivery process, from acquisition of patient consents to the actual consult by the specialist. Areas addressed in the planning included:

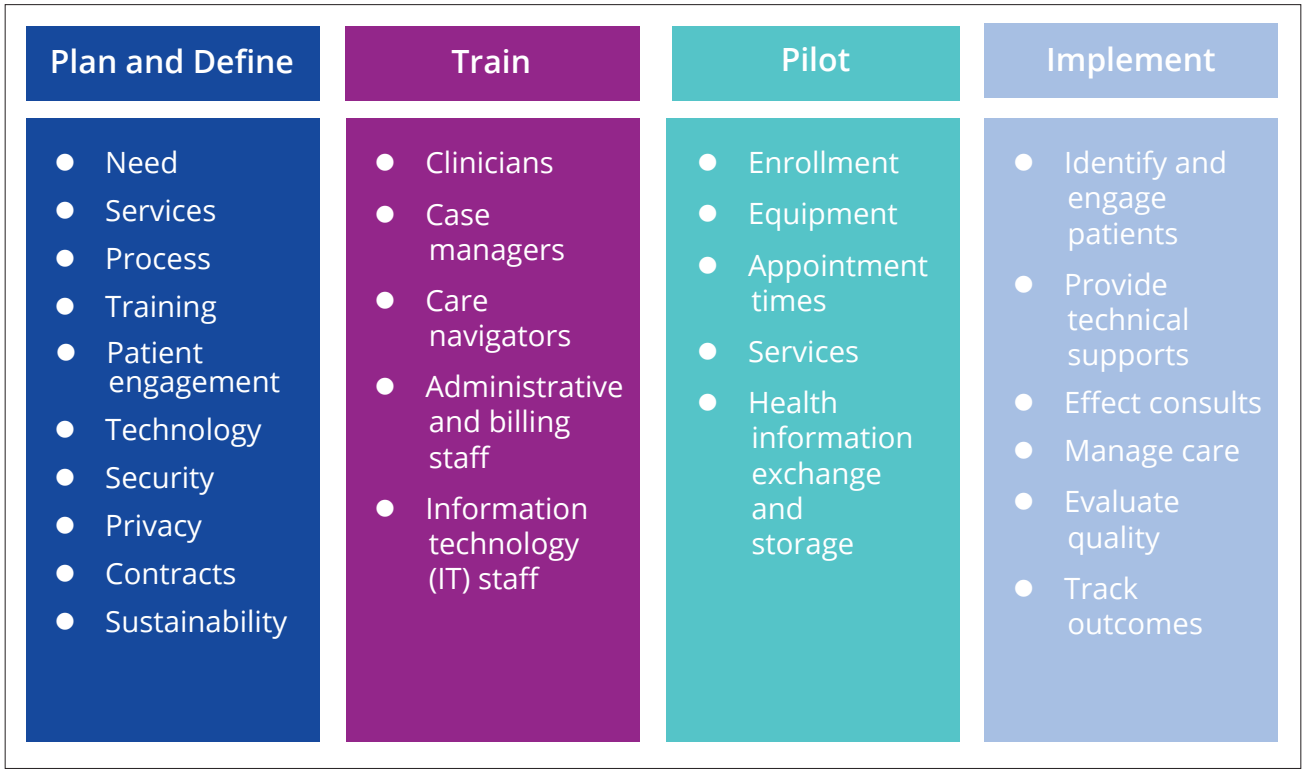
- Patient record acquisition, management, sharing, and storage
- Maintenance of privacy and security of patient health information across delivery systems

> "Implementing teledentistry services requires careful program development and the commitment of clinical, administrative, and support personnel."
>
> *—A case study informant*

- Equipment and technology to enable care at multiple endpoints
- Staff responsibilities at various stages along the continuum of care
- Design of care management and coordination of services for patients at both the hub and the spoke organizations
- Staff and clinician training on the care delivery process and use of the telehealth equipment at both endpoints
- Regulatory compliance issues
- Contractual agreements with providers and sponsoring organizations
- Reimbursement for services
- Durable program funding to ensure financial integrity and sustained service

Informants also emphasized the importance of piloting a new telehealth program for many months to a limited number of patients to ensure that services are seamless before full implementation to the public and to ensure that the service delivery process is agreeable and efficacious both for participating providers and for patients. Figure 1 provides an illustration of some of the various factors and stages involved in implementing a telehealth/teledentistry service delivery program.

Figure 1. Factors That Must Be Considered When Planning and Implementing Teledentistry Services



Source: OHWRC.

Infrastructure requirements vary by location, but certain basic technology is essential to provide high-quality services.

Implementing a teledentistry program requires adequate communication infrastructure, portable dental equipment, a source of sustainable funding, and a capable workforce trained to effectively use the equipment.

- Necessary infrastructure may include:
  - High-speed broadband networks/cables
  - Wireless modems
  - Dedicated bandwidth
  - Interconnectivity between information systems, including network interfaces and bridges
- Required equipment may include:
  - Desktop or laptop computers
  - Computer software, including imaging storage and retrieval programs, electronic dental records, and administrative and billing modules
  - Encryption and security software
  - Intraoral cameras
  - Portable x-ray equipment and sensors
  - Fixed, mobile, or portable dental chairs and other dental equipment, including water supplies, sterilizing equipment, etc.
  - Video conferencing technology, including monitors
  - Voice-over-IP for telephones

Teledentistry services are useful for delivering both primary and specialty dental consultations.

Organizations in the case studies used teledentistry to address shortages of either general or specialty dentists, or both, in their catchment areas. For many of those served by the various teledentistry programs, access to primary care dentistry was a basic issue. However, 2 of the case study organizations had adequate numbers of general dentists within their organization to provide primary dental services, so the issue of greatest concern for patients was access to specialty dental care.

When provider organizations were using teledentistry for consults with general dentists, the main functions of the service were to diagnose disease, to develop treatment plans, to determine the primary and preventive oral health services that could be provided to patients in their home communities, and to expedite referral and follow-up for dental treatment when necessary. One of the teledentistry programs in the case studies used real-time teleconferencing between dental hygienists, patients, and general dentists to determine a diagnosis and to complete treatment planning. The dentist would then direct the dental hygienist to provide the necessary preventive services after completion of the teledentistry consultation.

Other programs used store-and-forward teledentistry to enable diagnosis and treatment planning by the general dentist. The dental hygienist in these programs acquired images and x-rays, completed an oral health assessment, and provided education and preventive services during the initial patient visit. The records and images acquired during the visit were then forwarded for timely review by a consulting dentist, usually within hours or a day. Once diagnosis and treatment planning were complete, the dental hygienist managed patient notification and referral for any necessary follow-up treatment services.

Teledentistry services were also 2-pronged in some programs using both store-and-forward methods and real-time videoconferencing services in a staged plan of care. For example, a dental hygienist screening children in a Head Start program in the local community would acquire pictorial images and compile an oral assessment for a patient while also providing appropriate preventive services such as fluoride applications. The records and images were then electronically stored and forwarded to a general dentist in the sponsoring dental clinic for review and treatment planning. If, during review of the forwarded patient data, the general dentist determined the need for the child to have a specialty dental consultation, a real-time videoconference was scheduled for the parent and child with a consulting pediatric dentist at an external organization. The family was provided with an appointment at the sponsoring primary care dental clinic, where the family would be connected by video for the consultation with a pediatric dentist at the distant specialty clinic. Prior to that virtual encounter, the pediatric specialist completed a previsit review of the patient's dental records and images. During these specialty consults, the dental hygienist who had first treated the patient at the Head Start program generally managed the visualization of the child's oral cavity from the spoke site and presented the patient to the specialist at the hub location.

Teledentistry offers the opportunity to provide patient-centered services coordinated by an inclusive team of clinical providers and other organizational staff.

According to informants, the success of a teledentistry program is dependent on a team-based approach, which was described as essential for effective care delivery and for process management. In the case study locations, the teledentistry teams were variously constituted and mainly included oral health clinicians and auxiliaries, care managers, patient navigators, information technology (IT) personnel, social work professionals, community health workers, and administrative and executive staff.

For a teledentistry approach to care delivery to be effective, dental professionals must rely on the skills of others, especially dental hygienists, to accurately capture and report concerning areas of the mouth and dentition. Because teledentistry is interactive, the consulting dentist can request different views of a concerning area of the mouth in real time or at a subsequent encounter. According to informants, ongoing discussions about care management are essential to the quality of care and include all members of the care team. Teledentistry programs rely heavily on oral health professionals working to the extent of their competency and legal scopes of practice. Using dental hygienists in teledentistry programs in areas where it is not possible for a dentist to personally examine the patient is a strategy to increase access.[15]

The importance of maximizing the contributions of the entire clinical support team was evident in the teledentistry demonstrations observed for this project. Dentists providing consultative services in real time relied heavily on their interactions with the dental hygienists who were managing image acquisition from concerning areas of patients' mouths.

Dental hygienists working with a store-and-forward teledentistry modality were particular that the images were clear and their summaries of patient conditions were accurate so that subsequent treatment planning by the consulting dentist had as much supportive information and history as necessary. Interactions between dentists and dental hygienists concerning patients and their clinical presentations were ongoing. These oral health clinicians also relied heavily on a broader team of social workers, community health workers, and patient navigators for care management and navigation services to address logistical

> "Telehealth/teledentistry services are considered a value-based activity. Our FQHC operates in rural communities with few or no available medical or dental specialists, so these services provide access to specialty care. Patients and staff are educated from listening to and working with the specialists who care for the health center's patients. These services have also built professional relationships across provider systems and contributed to the quality of care in the comprehensive health home."
>
> *—A case study informant*

barriers for patients, and on IT experts for technical support to ensure the quality of the teledentistry services.

Many of the organizations in the case studies were providing teledentistry services using mobile dental operatories located at spoke sites such as schools, nursing homes, day habilitation centers, and mental health facilities in their catchment areas. The dental personnel at the spoke location with the patient were always dental hygienists who were sometimes assisted by dental assistants. In addition to teledentistry consultations for diagnosis and treatment planning, preventive services were being provided onsite to patients either prior to or immediately subsequent to the consultation or in a recall visit.

The ability to provide teledentistry treatment planning or consultative services as well as preventive services in local communities was facilitated by scope-of-practice parameters that allowed oral health providers to fully use their clinical competencies. Real-time video consultation was a necessary teledentistry modality in states in which a dental visit was required prior to provision of any services. Real-time teledentistry services allowed the dentist to direct the dental hygienist to provide preventive services subsequent to the teledentistry consult.

A store-and-forward teledentistry method was most effective in states in which a dental hygienist was allowed to provide preventive services without prior authorization of the dentist. The dental hygienist could acquire information and images during the patient's visit for preventive services to be used at a later time for treatment planning by a dentist. However, a store-and-forward method was not as effective or efficient in a state in which the dentist was required to authorize any services prior to delivery, as a patient would need to return for preventive services once a treatment plan was developed.

In all cases, IT staff, generally headquartered at the sponsor's location, were continuously involved in teledentistry efforts. In 2 of the case study locations, IT staff were actively involved in management of the teledentistry initiatives. IT staff were engaged in planning, implementation, maintenance, and troubleshooting the teledentistry process on a daily basis. Ensuring the privacy and security of the electronic health information that was transferred between providers was a high priority among administrators, clinicians, and IT support staff.

Teledentistry is a cost-effective modality for both patients and providers, but finding sustainable funding to provide the services is challenging.

Case study participants consistently commented on the efficiencies that accrue from teledentistry services for both patients and providers, remarking that teledentistry is a value-based service. An executive in one of the case study organizations commented that implementing teledentistry services for

patients allowed the organization to provide the full continuum of oral health services and thus effect a comprehensive dental home for patients.

However, case study participants also remarked that sustaining teledentistry programs continues to be difficult in light of concerns among policymakers around the effectiveness of these programs. A major barrier to further implementation of teledentistry services is the lack of support for teledentistry services from all insurers, but especially the reluctance of state Medicaid programs to fund teledentistry programs. Funding from state Medicaid programs is essential, as a majority of the target population in teledentistry programs are the underserved, many of whom are low-income or vulnerable populations dependent on public insurance programs.

A common challenge for providers of teledentistry services in the case studies was the identification of financial strategies to sustain the services. Many were blending funding from a variety of federal and state grants for technology installation, demonstration/pilot programs, or services to targeted populations. For instance, local or state senior service programs provided money to some teledentistry programs to address the needs of seniors. Several teledentistry providers were using funds from private philanthropy to supplement service revenue and grant funds to sustain the program. However, some were also able to mainly rely on revenue from Medicaid for services provided through the teledentistry program. Variability in state Medicaid requirements for teledentistry services was also a concern. Some states allow only for real-time consultations, while others limit reimbursement only to the consulting dentist without consideration of the costs incurred by the provider hosting the patient at the spoke location.

Case study participants described the distinct value in teledentistry services, commenting that investment in these services allowed providers to intervene earlier in disease processes. Informants observed that risk assessment and disease management through teledentistry would have positive long-term impacts on reducing the considerable costs for high-intensity services that result from persistent dental neglect.

Teledentistry is an effective modality for providing continuing education and training for practicing clinicians, for dental students and dental residents, and for other members of the oral health team.

Case study participants discussed both the tangible and intangible benefits accruing to their patients and to their organizations from the teledentistry program. The most obvious benefits were that teledentistry provided opportunities to assess the oral health status of patients, to accomplish risk assessment and determine treatment needs, to educate patients about treatment options, and to effect appropriate referrals. An important outcome from using teledentistry modalities is improved management of patients' oral health though a continuum of preventive and treatment services.

While understanding the benefits of providing services through teledentistry was of primary interest for this research, one important finding was that teledentistry was not only a tool for improving access to services but also an educational tool for practicing clinicians, including dentists and dental hygienists, for dental students and dental residents, and for other members of the oral health team. Case study participants discussed the positive impacts of teledentistry, including building effective care delivery teams. Informants also identified impacts on clinical practice within the organization from the ongoing interaction between primary care and specialty providers.

> "Telehealth/teledentistry services have changed the practice of medicine and dentistry in the clinics because of the frequent and ongoing communication between primary care providers and dentists and medical and dental specialists."
>
> *—A case study informant*

Several of the consulting specialty dentists participating in the teledentistry programs were also faculty in dental or dental hygiene professional education programs. Many commented on the utility of the modality for student and resident education. The cases that presented for specialty consults were described as often complicated and requiring more complex decisions about surgical treatment and management. These cases were instructive to students and residents who had limited exposure to the treatment needs of underserved populations. These students were also achieving a level of comfort with teledentistry modalities that might eventually be useful in their clinical practices.

The use of technology and teledentistry in education provides new opportunities for case learning and for interactive participation in treatment planning and consultation from distant locations. NYU Lutheran Dental sponsors dental residency programs throughout the US and internationally. The program places dental residents in 340 community training sites, most of which are dental clinics serving safety net patients. The residency program uses telecommunication to provide didactic education to its residents in both a national and a regional format. Residents access common learning modules at their convenience and select from a comprehensive array of course offerings. In addition, the clinical education component for dental residents is formatted as case learning exercises which occur at a local or regional level through videoconferencing. In the advanced education in general dentistry residency program, for instance, the resident selects a patient to present for treatment planning and over the course of the residency, presents on progress in completion of the dental treatment plan. This case sharing is instructive to residents in multiple locations as the patients are mainly selected for presentation as a result of their complex oral health needs and comorbidities.

In addition, general dentists and dental hygienists in organizations offering teledentistry services learned from the specialists with whom they interacted on an ongoing basis. Important cross-organizational relationships had developed from ongoing engagement with mutual patients. One executive observed

that the practice of both medicine and dentistry in the health center had changed as a result of using telehealth modalities to provide a more comprehensive continuum of services for patients that included specialty services.

Many of the clinical providers who were interviewed for these case studies expressed initial skepticism of the value and quality of teledentistry services. These same providers indicated that, having participated in teledentistry programs, they were now highly satisfied with the efficiencies and outcomes and had become proponents for expanding teledentistry applications for use with other suitable population groups.

Evaluations of the effectiveness of teledentistry programs are lacking. There are many outcomes of interest that would benefit from further study.

Informants offered that there were various outcomes of interest for teledentistry programs related to process, cost, and patients' oral health status. Case study participants discussed possible evaluations of teledentistry programs that would make useful contributions to the literature on the impact of teledentistry, including:

- Evaluations that compare the cost effectiveness of teledentistry services with that of traditional oral health service delivery
- Research on the impact of greater access to oral health services through teledentistry on patients' oral health outcomes over time
- Studies that describe how teledentistry increases the capacity of the consulting dentist to provide consultations
- Research on the impact of teledentistry programs on recruitment of general and specialty dentists to treat the underserved, as demonstrated by the number of completed referrals to local dentists or the number of local dentists accepting new Medicaid patients as a result of teledentistry referrals
- Evaluations that describe the number of dental students participating in teledentistry learning activities and the impact of these activities on their eventual willingness to use teledentistry in clinical practice

DISCUSSION

Teledentistry is an emerging modality for delivering oral health services to populations with significant difficulty finding services because of geography or other factors that limit the accessibility or availability of dental care. Case study participants commented on the efficacy of teledentistry for patients, especially on the advantages for triaging patients to the most appropriate level of care. A percentage of patients who were assessed through teledentistry consults were able to remain in their local communities for basic oral health services and for care management. As a result, scarce dental resources in communities were appropriately reserved for patients in need of more extensive treatment or surgical services or for those assessed at high risk for disease. In addition, informants to the case studies remarked that patients and providers expressed satisfaction with the quality of services and the outcomes from teledentistry consultations. Patients experienced shorter wait times to obtain consultation services, and providers found the modality efficient, timely, and cost effective.

While there appeared to be many tangible benefits from the use of teledentistry, case study participants also observed intangible positive effects on team building within an organization. Maintaining teledentistry program services required the ongoing participation of a broad range of clinicians and support staff in sponsoring organizations focused on patient-centered care. In addition, case study participants observed the educational benefits of teledentistry not only for patients but also for primary care providers, general dentists, and other clinicians who learned from case discussions with specialty providers about mutual patients through teledentistry.

Case study participants described teledentistry as a useful alternative modality for providing services to populations who lacked access to oral health care in their local communities. The convenient aspects of teledentistry for both patients and providers contributed to service value and also increased patient compliance with appointments. Teledentistry programs also provided access to important specialty services that were difficult to obtain, especially in areas where those services were available only at considerable distance from the patient's home community.

However, informants discussed regulatory and reimbursement barriers that affected providers' engagement with teledentistry, including scope-of-practice requirements that limited the practice of dental hygiene in remote locations, inadequate funding for teledentistry services, and regulations that inhibited their provision. Adequate reimbursement for the cost of delivering teledentistry services was a concern among case study participants, especially since costs to deliver those services accrue at both the hub and spoke locations. Rising interest in the use of teledentistry to address unmet need in certain populations has resulted in legislative action in several states to define parameters for the services and to provide funding for its use.

This study used qualitative methods to describe teledentistry programs in organizations providing oral health services to diverse populations, but was unable to find quantitative data to support the efficacy of such programs. Further quantitative research is needed to document the impact of teledentistry on cost of care, access to services, and patients' oral health outcomes. Several demonstration projects across the US promise to enhance knowledge of the efficacy and utility of the modality in the coming years. Data generated by existing programs and from proposed demonstration projects should provide better documentation to describe the benefits and impacts of teledentistry services on patients' oral health outcomes.

Appendix A

Apple Tree Dental
Minneapolis, Minnesota

- Apple Tree Dental is a large not-for-profit group dental practice founded in 1985 to meet the needs of frail elderly people living in and around the Twin Cities of Minneapolis and St Paul, Minnesota. The organization now employs more than 200 staff and delivers care to populations across the age continuum throughout the state.

- Apple Tree operates Centers for Dental Health (Centers) in 6 locations in Minnesota (Coon Rapids, Hawley, Madelia, Mounds View, Fergus Falls, and Rochester) and 2 locations in California (San Mateo and Half Moon Bay).

- The group dental practice also delivers onsite oral health services under written contracts with schools, Head Start programs, mental health facilities, day habilitation programs and workshops, assisted living facilities, and skilled nursing facilities at approximately 135 sites in both urban and rural areas throughout Minnesota.

- The organization maintains a focus on special-needs dentistry, providing services to low-income children and their families, children and adults with disabilities, and seniors living in residential facilities. This focus has led to innovative care delivery models that provide services in the least restrictive and most cost-effective settings. In 2015, 32,576 unique individuals received care through Apple Tree during nearly 95,000 patient encounters.

- Between 2002 and 2010, Apple Tree used a store-and-forward teledentistry model to meet the need for oral health assessment, preventive, and treatment services among Head Start children. In 2016, Minnesota restored coverage for teledentistry in public programs, allowing Apple Tree to again provide teledentistry services.

About the Organization

Apple Tree Dental is a large not-for-profit group dental practice founded in 1985 to meet the needs of frail elderly people living in and around the Twin Cities of Minneapolis and St Paul, Minnesota. The organization has grown to include more than 200 clinical and administrative staff. Dental professionals in the organization have clinical expertise in geriatric, pediatric, public health, and special care dentistry, prosthodontics, implantology, intravenous sedation, oral surgery, and hospital dentistry. Apple Tree uses a staff model; dentists, dental therapists, dental hygienists, dental assistants, and others are directly employed by the organization. The continuum of available services includes preventive, prophylactic, treatment, palliative, and surgical dental care.

Apple Tree has sister organizations in North Carolina and Louisiana that are governed by independent boards. In addition, Apple Tree has an affiliated organization in California that operates dental centers in San Mateo and Half Moon Bay. Apple Tree operates Centers in 6 locations in Minnesota: Coon Rapids, Hawley, Madelia, Mounds View, Fergus Falls, and Rochester.

Apple Tree's focus on special-needs dentistry has led to innovative care delivery models to keep patients healthy and to provide services in the least restrictive and most cost-effective settings. The dental practice currently provides oral health services under written contracts with schools, Head Start programs, mental health facilities, day habilitation programs and workshops, assisted living facilities, and skilled nursing facilities at approximately 135 sites in both urban and rural areas.

The organization also participates in multiple in-state and out-of-state oral health professions education programs, acting as a training site for dental residency programs, dental student externship rotations, dental hygiene student rotations, dental assistant student rotations, dental therapy and advanced dental therapy student externships, and nursing student clinical rotations.

In its 31 years of operation, Apple Tree has provided more than 1 million dental visits and screenings for patients. In 2015, 32,576 unique individuals received care through Apple Tree during nearly 95,000 patient encounters. The organization maintains its special-needs focus on providing services to low-income children and their families, children and adults with disabilities, and seniors living in residential facilities.

The organization uses a highly customized version of the Open Dental software to manage its cloud-based electronic dental records. Apple Tree is in phase 2 of its electronic health record (EHR) meaningful use objectives and has been using diagnostic dental codes in patient records since 1986. Apple Tree has extensive information management capability and owns servers that link all Apple Tree Centers and onsite care locations. It is the largest provider of geriatric and special-needs dentistry in Minnesota.

Most operating costs are covered by earned revenues with supplementation from private, public, and nonprofit sources, including grants from government entities and private foundations, and through philanthropic donations. For example, an annual golf tournament sponsored by an oral surgery practice generates contributions to Apple Tree. About 80% of the patients at Apple Tree's Centers and offsite locations are Medicaid insured; 10% are private pay and another 10% have commercial insurance. Medicaid reimbursements in Minnesota are among the lowest in the nation, which affects the proportion of net revenue from Medicaid relative to the services provided. While most revenue is from Medicaid (64%), 13% is from private pay and 12.4% is from commercial insurance. About 1% is from a state-funded program benefiting elderly veterans living at the Minnesota Veterans Home. The remaining 10% is from grants and other philanthropy.

Eighty-five percent of the Medicaid-eligible people in Minnesota are covered by one of 9 or 10 medical managed care organizations. The dental benefit administrator is generally separate from the medical administrator, with a few exceptions. Fifteen percent of Medicaid-eligible people qualify by disability and remain in the fee-for-service Medicaid program. Apple Tree provides services through 29 publicly funded Medicaid and MinnesotaCare programs throughout Minnesota.

The Centers for Dental Health at Apple Tree Dental

Apple Tree's Centers are focused on meeting the needs of patients and communities. Centers are designed to be welcoming, visually pleasing, and respectful of patient privacy. For example, the Mounds View Center is a state-of-the-art clinic designed as an overt expression of the principle that the physical environment, along with the care provided, should be patient centered. At Mounds View, a receptionist seated at the front door greets each patient by name. The patient is given the opportunity to complete the patient intake (updating insurance information and dental history) using a desktop computer located in a private area off the waiting room or to meet individually with an Apple Tree representative in a private navigation room to verbally provide the information. No personal information is exchanged in public.

The waiting area is spacious and includes a toothbrush station to allow patients to brush and floss their teeth before their appointment. The room is equipped with individual toothbrushes, mouthwash, and floss; a sink and towels; and a door that can be closed while in use. The Center's 16 dental treatment rooms are arranged in quadrants (quads), each containing 4 dental chairs. Each operatory is separated by

a wall with a common opening and hallway to easily access any of the chairs. Each quad is equipped with swing-away digital x-ray equipment and ergonomically designed patient and clinician chairs.

Each quad also includes a special-needs dental treatment room with a ceiling-mounted lift and a moveable patient chair to enable greater mobility for special-needs patients within the room and to provide the dentist or dental hygienist with greater access to the patient. It is possible to push the chair aside if preferable to provide services while the patient remains in a personal wheelchair. The x-ray equipment in the accessible operatory is equipped with an extra-long boom for flexibility in reaching the patient.

One of the 4 quads is designated as the Special Care Dentistry Clinic and includes noise-canceling features so that patients who are unable to control verbal expression can be treated without disturbing or distressing other patients. In the future, a bariatric chair will be added so that morbidly obese patients can be more comfortably and easily treated. The Center also houses a dental laboratory area and a centralized sterilization room.

The second floor at the Mounds View Center contains an ambulatory surgery suite where surgical services can be provided under intravenous anesthesia. Apple Tree's future plans include the capability to perform surgery for patients under general anesthesia. Apple Tree also plans to offer additional health services—for instance, podiatry care—to special-needs patients in the surgical suites.

Apple Tree has located their Centers in geographic areas that demonstrate substantial need for oral health services. As an example, the Hawley clinic is located in the geographic center of 5 counties within which there are high numbers of Medicaid-insured people. The Hawley Center provides 15,000 dental visits per year; however, capacity remains insufficient. There is a waiting list of more than 1000 people seeking to become patients.

Case study participants commented that there is strong community support for the efforts at Apple Tree to improve the oral health of underserved populations. The organization has a goal of establishing a sustainable model for care delivery. Informants commented that while voluntary and free oral health service delivery programs are helpful, those efforts are limited in scope and episodic by nature. Apple Tree provides ongoing care in an enduring dental home to people who might otherwise not have access to care.

Mobile Dentistry Services at Apple Tree Dental

Apple Tree's Centers include large garages for trucks that deliver the organizations' mobile dental equipment. Each night, drivers transport the equipment to the community locations at which services are scheduled for the following day. Each truck can move 3 fully equipped dental operatories to any location. The equipment includes dental and dental hygiene equipment carts, patient and provider chairs, a clean water supply, and x-ray equipment. Truckers arrive at a location the evening before services are scheduled and place the equipment in the designated space. Upon arrival in the morning, the dental team uncovers the equipment and prepares for service delivery. The equipment remains in place for a day, a week, or longer until current patient needs are met. Apple Tree owns a fleet of cars used by its dental teams traveling to offsite locations each day.

Comprehensive contracts with the various partnering community organizations are negotiated to appoint Apple Tree as the site's dental director. The dental director role provides Apple Tree with the authority to establish rules and procedures for oral health service delivery for clients of the organization. As an example, in affiliated nursing homes, a collaborative practice dental hygienist screens every resident and triages each to an existing dental home or to an Apple Tree dentist as needed. A daily mouth care plan is developed for every resident and becomes part of the patient's health record. The dental hygienist uses portable equipment located in a wheelchair-accessible space in each facility. The nursing home pays Apple Tree a fee for screening of residents, while other services are billed to responsible payers.

Apple Tree requires that each contracted organization designate a staff member within the organization to act as a dental liaison, to schedule and manage patients during the oral health clinic days and to help Apple Tree's care coordinators manage care. Dental liaisons help to obtain permissions for patient care from conservators or from self-directing patients. The treatment plans developed by the Apple Tree dentist are provided to both the patients and the families at a suitable literacy level to enable basic understanding of diagnosis and recommended services. One important side effect of Apple Tree's programs in community settings is enhanced oral health literacy among the staff and patient population around the importance of oral health.

Apple Tree currently provides school-linked oral health services using a team of professionals that includes dental assistants, dental hygienists, and advanced dental therapists who are permitted to provide basic restorative services under collaborative management agreements with dentists. The dental hygienists screen all children in the program using a risk assessment tool, take x-rays if indicated, and provide prophylaxis, fluoride varnish application, and education. Dentists or advanced dental therapists also provide treatment services to children as needed.

Dental hygienists are involved in outreach efforts to children up to age 18 who are in need of services and in educating parents on routine oral hygiene and healthy diet options. Outreach visits are scheduled at periodic intervals, sometimes for 2 or 3 consecutive days. The outreach efforts are scheduled in collaboration with Community Action Agencies, Head Start, and networks serving children. These community organizations often send flyers home to parents announcing the oral health outreach at least 2 or 3 weeks in advance. Outreach staff from Apple Tree transport equipment to and provide services at the selected site.

Mobile services are an important piece of the Apple Tree service portfolio. By providing services and care coordination in schools and in residential and day habilitation settings, the cost of care is reduced, patient satisfaction is increased, and the goal of achieving healthy mouths is furthered.

Workforce at Apple Tree Dental

Apple Tree employs a full complement of dental professionals and auxiliary personnel and emphasizes a team-based approach to care delivery. Dentists employed by the organization have a broad range of general and specialty dental expertise. Minnesota allows the practice of dental therapy. Apple Tree employs 6 dental therapists; all but one are qualified as advanced dental therapists, which allows them to practice remotely from their supervising dentists. The organization has a large cadre of dental hygienists and dental assistants who work both at the Centers and in the mobile programs.

Case study participants discussed the importance of building fully integrated teams that include dentists and others. Informants offered that their effectiveness depends on how well the expertise of one profession interfaces with the complementary competencies of others. According to leadership in the organization, frequent meetings as a team (or as a virtual team) to discuss patients improves expertise in differential diagnosis for all members. Quality assurance is improved when chart reviews are conducted by a team.

Dental hygienists were described as being accustomed to working in teams because of their experience working under dental supervision. It is sometimes harder for dentists to share responsibilities with a team. Informants felt it important to recognize that professionals with narrower scopes of practice and fewer clinical competencies than dentists might in fact be excellent at their specific services. Dental therapists, for instance, have substantial experience in basic restorations; dental hygienists were described as expert at prevention and radiographic assessment because of daily experience. Informants commented that patients benefit from the broader expertise offered when teams are used consistently and effectively in patient treatment and management.

The Teledentistry Program

In 2002, Apple Tree teamed with Head Start and other stakeholders throughout Minnesota to address the oral health needs of enrolled children. All 3- to-5-year-olds entering a Head Start program are required by federal regulations to have a dental screening examination within 90 days of enrolling in the program. However, this performance standard was often more difficult to achieve than those for medical services. At the time, more than 200 children in a 4-county area of Minnesota were having difficulty obtaining oral health screening and treatment services because so few dentists participated in the state Medicaid program in their local area.

The Minnesota Head Start, Minnesota Dental Hygiene Association, Minnesota Dental Association, and Apple Tree teamed to address this problem by asking state and federal officials to authorize an onsite care model that could include teledentistry. The consortium identified the specific geographic areas in Minnesota in which gaps were apparent. Then, representatives of the Dental Association organized local constituent group meetings to inform dentists in the region about the problem and encourage participation. The Dental Hygiene Association encouraged dental hygienists in areas of concern to seek certification in collaborative practice and engage their employing dentists in a collaborative agreement.

Before implementing teledentistry to increase access to care, Apple Tree pilot-tested the modality. An offsite dental hygienist collected images and information and transmitted them for subsequent dental treatment planning by an Apple Tree dentist. To determine if there were any quality issues with the treatment plans developed in this manner, another dentist then went with the dental hygienist to perform in-person patient treatment planning and to compare the results. The pilot study found that the decisions regarding necessary treatment services were consistent, whether they were developed remotely or in person.

Because the existing dental teams at Apple Tree were very comfortable working with each other, trust was not an issue. However, professionals were more skeptical about the technology piece until they gained experience. In some places, the community settings slated to implement teledentistry had insufficient bandwidth to securely transmit high-quality images. Real-time video consultations were tested during planning, but the team determined that this would not be as productive for the dentists as the store-and-forward method.

Once the teledentistry program was implemented, a dental hygienist from Apple Tree examined the oral cavity of each child, charted areas of concern, and acquired digital images using an intraoral camera. Each child's examination record and images were stored and then forwarded for a dentist's evaluation, treatment planning, and scheduling of restorative care when needed. At this initial visit, the dental hygienist also cleaned the child's teeth, applied fluoride varnish, and provided individualized brushing

instructions and oral health education. The dental hygienist returned for a recall visit to provide risk-appropriate preventive follow-up care. As a result of this project, the percentage of Head Start children receiving a screening examination statewide increased from 73% in 2003-2004 to 90% in 2006-2007. Treatment plan completion rates increased from 66% to 82%, the percentage of children needing follow-up treatment decreased from 32% to 27%, and the percentage of Head Start children with a dental home increased from 75% to 85% during the years the teledentistry program was in place.

In addition, the Head Start programs encouraged good oral health by having students brush their teeth every day after breakfast or lunch. Newsletters to families included articles on oral health. Staff spoke with parents about the individual needs of children, varying the conversation based on the different literacy levels and languages of the families. Apple Tree hosted dental clinics at local Head Start sites, including a local church in Pipestone, so that families could bring their children for necessary dental treatment services. The success of these clinics was notable; the show rate for appointments exceeded 90%. Compliance with proposed treatment plans was high, as were treatment plan completion rates. The teledentistry program was a positive experience for both the children and the parents, who expressed satisfaction with the services. The Head Start staff also benefited by gaining knowledge about healthy oral hygiene behaviors and nutrition, which allowed them to participate in teaching children and families. The population served was very diverse and included children from immigrant or migrant families, many of whom had significant dental treatment needs.

Apple Tree provided teledentistry services in Head Start programs for about 7 years, until 2010, when Minnesota Medicaid policy was changed to reimburse only dental services provided in face-to-face encounters. When the teledentistry program ended due to these Medicaid changes, some local dentists in southwest Minnesota, including pediatric dentists in the Pipestone area, agreed to accept children from the Head Start program. Some children were also able to access oral health services at a FQHC near the area.

The Minnesota Legislature recently passed a statute enabling the provision of telemedicine services beginning in January 2016. Rules for the provision of teledentistry services have been written but are currently in the comment period before adoption. Apple Tree will begin providing teledentistry services again in high-needs locations once the regulations are promulgated, which had not yet occurred at the time of this case study in June 2016.

The legislation requires that telemedicine services be delivered by a licensed health care provider via technology in the same manner as if the services were delivered face to face. Telemedicine is defined as the delivery of health care consultations or services while the patient is at an originating site and the provider is at a distant site. Services can be provided either in real time or using store-and-forward

technology. Teledentistry is included in the list of specialty health care services for which face-to-face contact is not required for diagnostic services.

According to case study participants, teledentistry is a productive method for providing patient-centered services. The dental hygienist gathers information and images, ensures parental consent, and coordinates care for each child. The dentist reviews records and discusses the case with the dental hygienist and others, as needed, and provides the recommended treatment services either during subsequent onsite visits or at one of Apple Tree's Centers. Teledentistry is also a means to ensure efficient use of scarce resources.

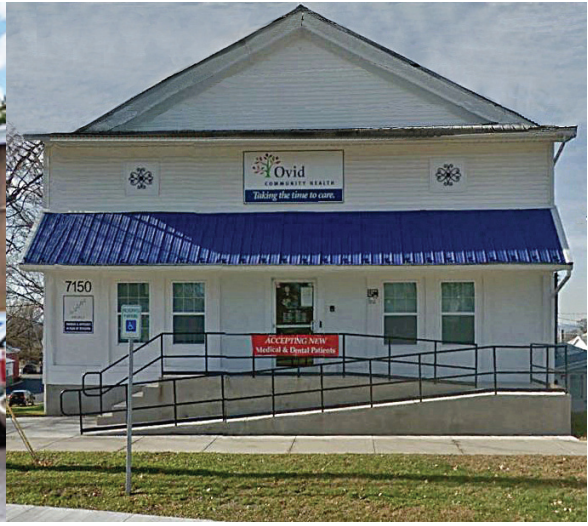
Approximately 30% of the children in the teledentistry program in the Head Start setting needed follow-up treatment services. Teledentistry enabled the dental hygienist to provide necessary preventive services at the Head Start location, reducing the need for travel to a dental office for the other 70%. Finding dentists who accept public insurance is challenging. By triaging patients to appropriate levels of preventive care in their communities, scarce dental resources are more suitably engaged to provide treatment services.

Informants commented that oral health can be achieved with the help of a range of professionals providing care in many settings. Teledentistry improves the experience of oral health care on many levels, especially for rural populations and for people with special needs, including seniors. Informants discussed the offsite visits that occur in several locations. A dental hygienist visits multiple group homes and a day habilitation center for adults with special needs to provide preventive services and maintain oral stability over time. The dental hygienist forwards the digital images, x-rays, and patient chart and requests that the collaborative dentist complete the examination and develop a treatment plan. Most patients receive all of their recommended preventive and restorative care onsite in their home community, and only those patients needing more advanced treatment must travel to a dental clinic.

Before contracting with Apple Tree, the group homes would schedule their residents with a dental specialist to provide oral health services in a hospital setting, often with a long waiting list. When these patients are maintained in the community, their oral health can be stabilized, reducing the need for care in higher-cost settings. The benefits are both tangible and intangible and include significant cost avoidance for specialty services. According to the leadership at Apple Tree, by consistently providing preventive services, Apple Tree's programs not only build better oral health but also build better dental patients who are not afraid of having someone work in their mouths.

Teledentistry was described as an ideal application for seniors in residential care because the patient experience is much less stressful than being transported to a dental practice in the community. Teledentistry services allow the patient to avoid the high cost and considerable inconvenience of transport out of the facility. Families are not required to take time from work to accompany the patient.

In addition, dementia in this population is problematic, and cooperation with dental procedures is often much greater when onsite dental care is provided with the help of familiar nursing staff caregivers and in the residence where they live. The equipment used in nursing homes, schools, and other remote locations is the same as that located at Apple Tree's Centers, except that the mobile equipment is on a custom base with wheels. The range of services provided by dentists and dental hygienists in community settings is nearly identical to that provided at Apple Tree's Centers, including diagnostic, restorative, and surgical services.



Finger Lakes Community Health
Penn Yan, New York

- Finger Lakes Community Health (FLCH) was established in 1989 as a standalone health program for migrant and seasonal farm workers in the central and south-central lakes region of New York. FLCH subsequently obtained FQHC status.

- FLCH currently serves more than 25,000 patients annually, approximately 9000 of whom are agricultural workers.

- FLCH has 8 primary care clinics, 5 of which have co-located dental clinics. In addition, FLCH has 2 standalone dental clinics in Penn Yann and Dundee, New York. FLCH provides mobile dentistry services in numerous locations throughout the region.

- FLCH began providing telehealth services in 2002 with grant money from HRSA. Teledentistry is now the most commonly used telehealth service at the FQHC.

- Teledentistry services are offered only for children, many of whom are under age 6 and experiencing serious dental decay. A pediatric dentist at the Eastman Institute for Oral Health in Rochester provides the specialty consultations for the teledentistry program.

- To date, 534 children have received a teledentistry consult; 54% have received treatment under general anesthesia, and of these, 94% have completed their treatment plan.

About the Organization

Finger Lakes Community Health (FLCH) was established in 1989 as a standalone health program for migrant and seasonal farm workers in the lakes region of New York. Over the following years, program expansion occurred as the health care needs of other populations in the geographic area became apparent and as farm workers settled into local communities in other jobs. The first expansion was the Port Byron Health Center, which was designated an access site in 2002. FLCH is currently both a FQHC and a migrant health center designee of HRSA. FLCH offers medical, dental, behavioral health, and pharmacy services and a broad range of telehealth services, including teledentistry.

FLCH is one of only 22 providers in the US with a migrant voucher program and has agreements with more than 150 provider sites throughout 42 counties in New York State to provide necessary care to eligible farm workers at a negotiated rate. The FQHC has 8 primary care clinics, 5 of which also provide co-located dental services throughout central and south-central New York, in addition to 2 free-standing dental clinics, one in Penn Yann and the other in Dundee, New York. In addition, FLCH has both mobile medical and dental service programs for agricultural workers and their families at housing sites, Head Start centers, and school and summer-school sites.

FLCH currently serves more than 25,000 patients annually in the affiliated health centers and at mobile delivery sites; approximately 9000 patients are agricultural workers. The patient population is growing about 10% annually. Patients primarily work in agriculture, in local factories, or in retail establishments. Many patients work multiple hourly wage jobs.

The patient population is diverse. The predominant language among migrant farm workers is Spanish. Sixty-two percent of the patients speak a primary language other than English; about 53% of the staff at the various FLCH clinic sites are bilingual. There is a large Mennonite population in some regions served by FLCH. Forty-four percent of patients are insured by Medicaid, 7% by Medicare, and 34% are uninsured; services to the uninsured are mainly supported by grants covering migrant workers or through patient self-pay on a sliding-fee scale fixed to income.

The health center permits walk-in patients; this policy accommodates farm workers who cannot easily arrange transportation to the clinics or take leave time from work, especially during the growing season. When it rains or if a farm truck is traveling to town, farm workers can avail themselves of the opportunity to get to the clinic and be seen without an appointment. The various clinics are open evenings for patient convenience. FLCH is also considering offering urgent-care services and a call center for patients on weekends. One barrier to a weekend clinic is the lack of availability of real-time radiology reading services, which are necessary to effectively provide services.

Portable dentistry services are provided for children at numerous sites in the extensive geographic catchment area, including:

- Nine of the 12 New York State Agri-Business Child Development (ABCD) Centers that offer Early Head Start or Head Start programs to farm worker families and other eligible children
- Schools within the Geneva City School District, the Seneca School District, and several schools in Wayne County and Tompkins County, including the Hillside Children's Center
- Seasonal labor camp sites in King Ferry and Mt Morris
- A church in Copenhagen, New York

Dentists, dental hygienists, and dental assistants variously constitute the mobile teams. Every child receives preventive oral health services twice a year. A dental hygienist visits the Early Head Start and Head Start programs every 3 months and, over time, has observed improved oral health in the children in these programs. Normal prevalence of caries in young children in those programs approached 50% to 60% in the past; it now averages about 22%. Among 125 children recently treated at 4 of the early-intervention sites, only 3 children were identified as having significant dental decay.

More than 4000 farm workers are provided with health and dental services in labor camps each year; mobile and portable services are essential to meeting the significant need in that community. All community health workers/patient navigators working in the seasonal camps carry iPads or laptops equipped with hot spots to enable communication with clinical providers and others in the fixed clinics when problems arise.

Telehealth Services at FLCH

FLCH began providing telehealth services in 2002 with grant money from HRSA. Case study participants observed that, at the time, FLCH was providing mobile health and oral health services to farm workers. Very few of the patients treated in the mobile programs ever completed specialty referrals emanating from those visits. The barriers to specialty care were numerous and included lack of insurance, limited transportation options, considerable geographic distances to specialty providers, cultural and language differences, and the inability to take time from work during the day.

The need for telehealth services became increasingly apparent as the FQHC considered the needs of their patients, especially the farm workers, many of whom were undocumented and unable to freely access health services. Executive leadership at the health center expressed the belief that, as a patient-centered medical home, FLCH was obligated to provide access to a full range of health services to improve health

outcomes. The health center had a commitment to enabling specialty care for the patient population in order to provide a continuum of care.

Historically, when the need for specialty services arose, FLCH would arrange a specialty consult and transport the patient to the specialty provider. A bilingual community health worker/patient navigator from the health center accompanied most patients to those appointments, as specialty offices were often not well equipped for limited English speakers. In these circumstances, the community health worker was away from the health center for 6 or more hours; the patient was not paid for the missed hours at work; and the FQHC was incurring the non-reimbursable expense of transportation to distant providers. When health center administration considered the cost for these services in quantity, the need to find a more efficient way for patients to access specialty consultations and to limit distant visits to only those for necessary treatment or surgical follow-up became apparent.

Health center staff reviewed patient utilization patterns and identified the need to build capacity for specialty consultation in mental health, otolaryngology, dentistry, and diabetic retinopathy. FLCH began to build a network of specialty providers willing to consult with and/or treat clinic patients and to build a bridge system to enable teleconsultation between FLCH's health clinics and specialty providers.

Telehealth services are now an integral part of the service menu at FLCH. Specialty providers contracted to provide real-time video consultations and counseling sessions are located in multiple states, but mainly in New York. For example, a specialty consultant in the diabetic retinopathy telehealth program is located at the University of California, Berkeley; mental health specialists are located at St Joseph's Hospital in Syracuse, New York; and the consulting pediatric dentist is located at the Eastman Institute for Oral Health in Rochester, New York.

Telemedicine and teledentistry services are highly developed at FLCH. The health center enables real-time consultations between patients and specialists but also uses a store-and-forward modality to allow clinical providers to review images and medical/dental records at a later time. The videoconferencing technology is also used to enable continuing education for staff at the health centers, who can participate in an in-service education program from various physical locations.

Planning for Telehealth Services at FLCH

Informants commented on the importance of identifying the gaps to be addressed with a telehealth/teledentistry application and determining how that can best be achieved. According to informants, telehealth services are not easy to implement in places with significant ongoing organizational change. Implementing telehealth services successfully for a patient population requires stability in program and administrative staffing.

Before actual provision of any telehealth service occurs, a team is assembled at FLCH to discuss the need and define, in detail, the process for providing a particular health service. Preparatory work to identify and negotiate with specialty providers willing to offer consultation and treatment services for patients is ongoing during the planning process. Contracts, which must be in place before initiation of any clinical services, describe the details of how and when appointments will be scheduled, how referrals are to be effected, and how care coordination is to occur. Specialists agree to a negotiated rate for the consults, which is paid by FLCH.

FLCH requires that a care coordinator be assigned at both endpoints to ensure appropriate follow-up for patients both on the primary care side and in the specialty clinic. The technology at both the hub and the spoke site must be obtained, connected, and tested. Before a new program is implemented, the project coordinator from FLCH spends several days at the partner site helping technical staff and clinicians connect to the dedicated bridge and navigate the technicalities of providing clinical consultations at a distance from the patient. The telehealth program is selectively piloted for a year before full implementation with patients to ensure a seamless process.

According to case study participants, providers and organizations partnering with FLCH in the telehealth/teledentistry programs are very engaged; many are encouraging others in their health systems to adopt telehealth technologies. FLCH is in constant communication with partners as programs continue to grow.

The quantity of telehealth services now being delivered to patients required the health center to hire an IT position to work at least half time solely on telehealth applications as well as a scheduler to manage the large volume of services and some of the care coordination functions for the various telehealth programs. All scheduling for teledentistry services is passed through the care coordinators on staff. The expansion in the variety and number of telehealth services has created a need for a new bridge and phone center to accommodate the ever-increasing demand.

Technology to Provide Telehealth/Teledentistry Services

The technology to enable services ranges in type from networking bridges to peripheral equipment specific to the medical or dental specialty services offered. Electronic health/dental records, video conferencing equipment, and voice-over-IP for telephones are essential technologies to enable satisfactory communication.

The equipment used for videoconferencing at the various FLCH center sites is mainly Tandberg Precision equipment from Cisco. Real-time telehealth consultation is available through telephone conference lines that are HIPAA compliant as well as through video conferencing. Every health center is equipped with a medical and/or dental cart that contains the various peripheral equipment needed for a specialty

consultation. The peripherals are generally quite easy to use, so training of staff is achieved quickly.

The medical record platform is eClinicalWorks, and the electronic dental record platform is Open Dental. Although there is very little broadband in rural communities, Internet providers like Windstream operate in rural areas and generally offer sufficient bandwidth to enable teleconsultations. Approximately 50 to 100 megabytes of bandwidth must be dedicated to the telehealth/teledentistry application.

One of the key components for an effective telehealth/teledentistry consultation is the availability of IT support at each endpoint for both the presenting professional at the spoke and the consulting specialist at the hub. Appropriate lighting is important, and an understanding of proper usage of the video and peripheral equipment is essential. Informants commented that simple tasks like knowing how to mute or unmute or how to zoom in or out can affect the quality of the consultation and alter patient and provider satisfaction with the visit.

Sometimes new providers become flustered by the technology. The technical team works diligently to ease concerns and make providers comfortable with the equipment before patient encounters begin. While there is a learning curve, providers become increasingly comfortable with the equipment as frequency of use increases. Providers and/or presenters often log in to check the equipment and the connection prior to a patient visit. Program staff encourages feedback about what is working and what is not through patient and provider satisfaction surveys. FLCH IT staff have also adopted practices to ease troubleshooting across sites, such as assuring that the Ethernet cable is the same color in every location and that the peripheral equipment is the same brand across clinics.

According to informants, delivering telemedicine or teledentistry services does not require expensive equipment. A telehealth/teledental cart containing the peripheral equipment for a variety of health and dental consultations costs about $15,000. Ideally, the health clinic would have a monitor in every exam room, so that multiple consultations with multiple specialists could occur at the same time at a health center.

Informants at FLCH observed that the use of telehealth applications is exploding as recognition of their promise as an essential tool in providing value-based care for patients increases. Interoperable information systems would further increase the opportunities for collaboration between health networks and allow for expansion in the telehealth arena.

Teledentistry

Implementing teledentistry services required careful program development and the commitment of administrative and support personnel. Teledentistry was viewed by informants as an especially promising

modality by which to deliver services to people with developmental disabilities or special needs, nursing home residents, people in rural areas or inner cities, and children in schools and preschool programs. The benefits of teledentistry were most evident to informants when they considered the beneficial outcomes, including shorter time frames to obtain specialty consultations, higher treatment completion rates, lower no-show rates for appointments, and improved workflow efficiencies for patients, providers, and support staff.

In the Geneva health center of FLCH, the widescreen video monitor is mounted on the wall of one of the dental operatories. Fixed equipment limits the availability of teledentistry services to that room. In Geneva, therefore, the operatory is blocked for a period during which only teledentistry services are offered. However, in the other centers, the equipment resides on a portable cart that can be moved to any examination room or dental operatory as needed. Videoconferencing in those centers is achieved using laptop equipment, and it can be initiated in any patient room.

Currently telehealth and teledentistry services at FLCH are provided through portal-to-portal connections. Exchanging patient records, including medical and dental histories, across health systems remains cumbersome, which is problematic. Electronic medical and dental records must be securely faxed or emailed because regional and statewide health care information networks are not yet fully developed and specialty providers in the telehealth and teledentistry networks are not all participating in organizations connected to regional health information networks.

Teledentistry is now the most common telehealth service at FLCH. The teledentistry program began with a focus on children at the Head Start sites visited by FLCH's dental hygienists. A dental hygienist would identify children with extensive caries and then consult with the FQHC's general dentists about the case. The dental team at FLCH has regular team meetings at which providers discuss the need for specialty referrals. The dental team at FLCH consists of 10 dentists (some working full time and others part time), 7 dental hygienists, and 15 dental assistants. Once it is determined that a specialty consultation is needed, the case is scheduled for a teledentistry consult.

The pediatric dentist at the Eastman Institute for Oral Health in Rochester who is the specialty consultant initially agreed to participate in the teledentistry services only on a trial basis. He is now convinced of the merits of the program for both patients and providers and is a strong proponent of teledentistry. One of the aspects of teledentistry that the dentist most enjoyed was the ability to evaluate the child's behavioral aspect while the child was in a familiar place.

The Eastman Institute is located in a very busy hospital environment that might be disorienting to patients and parents; consulting with children and parents in their primary dental home enables a calmer initial evaluation. The teledentistry consult helps to establish the patient–provider relationship. Children

and parents who first had a teledentistry visit in the presence of a familiar dental hygienist were more comfortable when they actually met the specialist in person at the hospital for services than if they were meeting for the first time. Patients are also receptive to the convenience of teledentistry services. Children especially enjoy seeing their teeth on a television screen.

Teledentistry services are offered only for children, many of whom are under age 6 and experiencing serious dental decay. While dental patients at the FQHC are not generally required to also be primary care patients at the health center, children who are identified through the teledentistry program as requiring treatment or surgical services from a dental specialist are required to also be or to become primary care patients at the health center. FLHC manages all of the hospital admission paperwork and preoperative examinations for the child to be treated at Strong Memorial Hospital for surgical services. The necessary clearances would be very difficult to arrange for a child who was not also a patient of record at the clinic.

FLCH assigns a community health worker/patient navigator to every child in the teledentistry program. Each navigator carries an average caseload of about 40 patients. Navigators are trained in oral health, are sensitized to the needs of the community, and are very successful navigating patients to treatment services. In the past, there was a 9-month waiting period for a child to get surgical services in Rochester. Since the advent of the teledentistry program, that has been reduced to 3 to 4 weeks. In the past, there was also a 50% no-show rate, but using a patient navigator to transport and translate for patients has vastly improved the completion rate for treatment plans.

To date, more than 550 children have received teledentistry services through FLCH. Teledentistry has increased the capacity for the pediatric specialists who participate in the program because it improves workflow and expedites the initial consultation. There is a no-show rate for regular dental services at the FQHC of about 25%, but a lower no-show rate for teledentistry services.

Children are selected by the dental professionals at FLCH for referral to the pediatric dentist in Rochester depending on a number of factors, including age (younger children are more difficult to treat), severity (some children have considerable childhood caries that requires quadrant or whole-mouth dentistry), and behavior (some children find it difficult to remain still in a dental chair for the duration of a dental procedure). Dentists at FLCH complete as much of the necessary dental work on children as possible. However, the health center does not currently provide nitrous oxide analgesia. FLCH hopes to initiate that service in the coming months, which will enable some children who currently must go to Rochester to receive care at one or another of FLCH's dental clinics.

When it is determined that a child needs a specialty consultation, a care coordinator meets with the family to complete permission slips and enters the referral into the system. The patient's dental records and paperwork are uploaded to the electronic dental record, and the patient is added to an active log

for follow-up. The care coordinator from FLCH works with the care coordinator at the Eastman Institute who is assigned to the teledentistry program to identify an appointment time for the consultation.

All families receive a reminder call the day before the scheduled teledentistry encounter to confirm their intention to complete the appointment. When the family arrives, they are accompanied by the care coordinator to the consultation room, where the dental hygienist who manages the intraoral camera is waiting. The specialist appears on the monitor and introduces himself to the child and the family. He asks if the family has any questions; once answered, the clinical examination begins. The dental hygienist inserts the camera and manipulates it to provide a view of each tooth while the dentist observes and interacts, asking for views of the various teeth and surrounding areas at different angles.

All dental records related to a case are transmitted to the specialists by secure email or fax prior to the teledentistry encounter for previsit planning and to ensure that the dentist is aware of the oral conditions that require his or her expertise. While there is currently no electronic exchange of x-rays, FLCH will install digital x-ray equipment to enable transmission of x-rays to Rochester by late summer 2016.

Once the specialist confirms the necessity for treatment or surgical services, the care coordinator at FLCH works with the parent(s) to complete the necessary paperwork for hospital admission and also manages the scheduling of the surgery. The care coordinator accompanies the family to Rochester if the family needs transport or translation services. The specialists at the Eastman Institute try very hard to complete as much treatment as possible in the dental suites at the Institute. Still, approximately half of the referred children require treatment in an operating room. To date, 534 children have received a consult; 54% have received treatment under general anesthesia, and of these, 94% have completed their treatment plan. There is currently no local hospital with the capacity to handle these cases; Rochester is, therefore, the closest equipped location.

The dental team at the FQHC meets monthly to discuss difficult cases, including the inability to reach families for follow-up. The meetings include the dental director, the care managers or case coordinators, the specialist at Eastman, the insurance navigator, and the telehealth coordinators. The consulting specialist and others call in through the bridge and navigate through the patient log to discuss each child. The policy at FLCH is to contact parents at least 3 times before engaging social workers to ensure that all of the children receive needed care.

Case study participants commented on another efficiency from the telehealth/teledentistry program. FLCH has interpreters at each clinic who can be summoned to an exam room at any time to aid with translation. One interpreter can now be used by multiple patients in the same afternoon for telehealth/teledentistry specialty encounters. This was not possible when the interpreter was traveling with an

individual patient to a specialty appointment that might consume an entire morning or afternoon, limiting the availability of the translator until his or her return to the health center.

The Benefits of and Barriers to Teledentistry

Telehealth/teledentistry services are considered a value-based activity at FLCH. Because the FQHC operates in rural communities with few or no available medical or dental specialists, these services provide needed access to specialty care. Telehealth/teledentistry services have built professional relationships across provider systems and have contributed to the quality of care in the comprehensive health home. Teledentistry has proved to be mutually beneficial for FLCH, patients, and partner organizations. FLCH provides much of the administrative work that is required at the front end of patient care and a dental home for the patient for follow-up services, which is helpful to both specialty providers and patients.

Case study participants commented that telehealth services have changed the practice of medicine and dentistry in the health center's clinics because of the frequent and regular communication between primary care providers, general dentists, and the various specialists. Staff continue to learn from the specialty consultations, and patients express satisfaction with the services. There is a beneficial exchange of information between providers at both endpoints, and the services are efficient and cost effective.

There are some barriers to delivering services through technology, such as a limited number of specialists (particularly in mental health) who are willing or available to provide services. FLCH employs only 2 licensed clinical social workers (LCSWs) to provide counseling services to patients at 8 clinic sites. While providing counseling services via teleconferencing is more efficient than traveling from clinic to clinic for individual appointments, more LCSWs are still needed than are available.

Funding for teledentistry services comes from a number of sources. Community health workers are funded through grants for health services to migrants. The technology is funded through US Department of Agriculture grants, and the workforce is mainly funded through reimbursement for services. There are new telehealth payment regulations in New York State that are currently out for comment. Teledentistry is a covered service in the legislation, but proposed payments for the presenter site are limited in the regulation. This was a source of concern to FLCH at the time of the case study, as the health center must cover the costs for management and delivery of the services in the various telehealth/teledentistry programs.

NYU Lutheran Dental Medicine
Advanced Education in General Dentistry (AEGD) Residency Program
NYU Langone Health System
Brooklyn, NY

- NYU Lutheran Dental is the largest postdoctoral dental residency program in the world offering dental residencies in general practice, advanced education in general dentistry (AEGD), dental public health, pediatric dentistry, dental anesthesiology, orthodontics, and endodontics. These residences are located at 340 training sites in 26 states throughout the US as well as in some international locations.

- Dental residents treat approximately 1.5 million patients annually mainly in FQHCs and other community dental clinics treating underserved populations.

- In 2016, the AEGD residency had 248 residents in placements at 100 clinical training sites. Each site is equipped to enable distance learning and videoconferencing for residents.

- Each resident is required to select and presents a case through videoconferencing to dental residents and faculty at other residency sites. Residents receive guidelines for case selection, work-up and presentation. Residents are encouraged to select cases which require phased treatment and to present all steps to completion (eg, pre-op, post-op and sequela).

About the Organization

NYU Lutheran Dental is part of the NYU Langone Health System. NYU Lutheran Dental is the largest postdoctoral dental residency program in the world offering dental residencies in general practice, advanced education in general dentistry, dental public health, pediatric dentistry, dental anesthesiology, orthodontics, and endodontics. These residences are located at 340 training sites in 26 states throughout the US as well as in some international locations. The program has 650 affiliated faculty. Dental residents treat approximately 1.5 million patients annually. These patients are generally those who seek care in safety net organizations.

NYU Lutheran Dental not only operates a successful residency program, but does so with the use of teledentistry to maximize learning, promote greater exposure to diverse populations and complex cases and create a network of health centers and organizations engaged with students and faculty.

The advanced education in general dentistry residency program (AEGD), one of the several dental residencies at NYU Lutheran, places dental residents in multiple locations across the US and its territories (St. Croix, Virgin Islands and Puerto Rico), as well as in an international site in Trinidad, West Indies which has dental and medical schools. In 2016, the AEGD residency had 248 residents in placements at 100 clinical training sites. Most were federally qualified health centers (FQHCs) or other community dental clinics. Several dental schools also served as clinical training sites for residents. A department of corrections facility in Puerto Rico is among the host sites.

NYU Lutheran uses the American Dental Education Association (ADEA) Postdoctoral Application Support Service (PASS) and match process which allows students to apply to multiple residency programs and also match with a specific location for placement. Students select the NYU Lutheran residency program for various reasons including to gain exposure to and experience with the oral health needs of diverse populations, to be close to home, or to experience practice in a unique setting other than private dentistry.

Once placement is made, the residents may work at a host FQHC with only a single dental clinic or at one with multiple dental clinic sites. Students may be assigned to a distinct clinic or rotate through many. In any case, residents are exposed to different, often complex populations with a variety of oral health conditions and intensity of treatment needs.

Teledentistry - Modalities and Support

In year 1, the majority of the didactic component of the residency training (75-80%) is delivered through distance learning, in on-line self-directed study. The didactic curriculum is available on the Sakai interface

which is an open source Java based instructional platform. The curriculum is generally delivered asynchronously to allow students to access the learning modules at their convenience. However, there is a required clinical component that is delivered synchronously on a local or regional basis that allows residents to interact with other residents and faculty at other facilities to discuss treatment planning and treatment progress using patient case studies.

Residents must complete between 14 and 16 training modules each month beginning in July and ending in the following June. Residents connect to the password protected learning system via laptops or desktops. Each module ends with a test; residents are required to score 100 percent; if the score is lower the resident is required to retake the test until all questions are answered correctly.

In addition, Lutheran uses the Blue Jeans platform to deliver the clinical training for residents in real time over a secure online system using video-conferencing equipment. Blue Jeans is a video collaboration platform that allows for interactive synchronous learning. Residents present cases and treatment plans for patients in their practices as well as the findings from literature reviews that support their diagnosis and treatment planning. Residents are required to participate in at least 4 clinical learning hours each month and a minimum of 12 patient care conferences during the year of residency. Many residents participate in more than the required number.

When there are large cohorts of residents clustered in an area (eg, the 5 boroughs of New York City and New Jersey), the groups on the teleconferences are mainly local. However, in some areas of the country where there are fewer residents and fewer closely located host organizations, residents are grouped by region for these interactive case study sessions. Regions collaborate with one another to create a larger study cohort and to insure case diversity. These collaborations also provide the residents with exposure to a variety of dental faculty facilitators with differing experiences and expertise in dentistry.

The selection of the learning platforms was accomplished by a dental education group which is constituted of the dentists and others who provide oversight for the training programs. A dedicated information technology (IT) specialist employed by NYU Lutheran is responsible for maintenance and management of both the Sakai and the Blue Jeans platforms. Since Lutheran Health Systems was acquired by NYU Langone Medical Center in 2016, the residency programs now have access to the medical center's large cadre of IT support personnel. At the time of this case study, NYU Lutheran Dental was in the process of harmonizing the dental residency training programs with the medical residency program at NYU Langone, linking the Sakai learning platform to their applications to enhance learning opportunities for students.

Each training site in the residency program is required to have the necessary equipment to support the distance learning and videoconferencing for dental residents. Many of the residency sites were already

equipped with the necessary videoconferencing equipment including dedicated conference space, microphones and broadband in their meeting spaces so equipment was not generally a barrier for host clinics. One important requirement is that broadband networks be sufficient to manage the transmission of clear diagnostic images. Some clinics found it necessary to secure more bandwidth to meet the standards of the residency program.

Grant funding from the US Health Resources and Services Administration, the Bureau of Primary Care and the US Department of Agriculture have supported the expansion of oral health services in host clinics as well as the installation and use of teledentistry/ videoconferencing equipment to support greater access for patients and to provide learning tools for residents. The AEGD residency is also supported through Graduate Medical Education (GME) funding.

Learning Methods - Dental Case Presentation

The case presentations during the clinical conferences have 2 components. Each resident must first make a presentation about the diagnosis and treatment planning for a selected patient using a variety of tools (eg, radiographs, photos, intra-oral pictures). The resident must propose three treatment options including an ideal plan, an alternative plan, and an acceptable plan. The requirement for development of several treatment plans forces residents to consider multiple options that not only meet the standards of treatment but are also acceptable for the patient. Alternative and acceptable plans provide treatment options within the parameters of accepted clinical practice but include procedures that are generally less extensive or less expensive than the ideal. For example, not all patients can afford to pay for expensive dental implants or tolerate the treatment time required to accomplish this outcome. An alternative option might be a dental bridge.

While implants were generally out of reach for the uninsured or the publicly insured, some of the dental clinics that participate in the residency program are supplying implants to some low income patients. These clinics have purchased milling equipment to create bridges and implants and have encouraged staff dentists to train in implantology. Thus, services that were previously inaccessible to safety net patients are now available through some innovative provider organizations.

Case presentations offer residents the opportunity to learn best approaches to the oral health needs of a patient and to develop plans that consider patient's medical and dental histories as well as socioeconomics, behaviors, and other factors that affect a patient's ability to complete treatment plans.

Residents receive guidelines for case selection, work-up and presentation. Residents are encouraged to select cases which require phased treatment and to present all steps to completion (eg, pre-op, post-op and sequela). There is an expectation that the resident will select a relatively complex patient for this

exercise since these cases provide important opportunities for learning, especially about case management. Special needs populations and those who are medically compromised or have multiple medical comorbidities are challenging to treat and manage but are often present in the diverse patient populations in clinical rotation sites in which residents are working. The case presentations must be HIPAA compliant; patient identifiers are not shared. Patients are asked for consent to be photographed and where possible, any identifying facial features are redacted if not essential to the case presentation. All network transmissions are secured and meet privacy and security standards.

Subsequent presentations to the learning group include reports on treatment progress and completion of treatment plans. These presentations occur over the year of the residency placement.

Residency Program Standards and Evaluation

Each residency site must meet the standards of the Commission on Dental Accreditation (CODA); each receives a site visit from CODA prior to accreditation. All sites, therefore, meet baseline requirements. However, each site serves a different case mix of patients (eg, children or children and adults). Some perform more advanced dentistry (eg, implants) or more orthodontics which has the added effect of creating a pipeline for residency programs in pediatrics and endodontics.

Residents complete a program evaluation in November of the residency year, again in March and then again after graduation and provide appraisals of the didactic and clinical training, the supervising faculty and the resources at the site. NYU Lutheran Dental reported increased satisfaction with the residency training program in recent years. In addition, the number of FQHCs wishing to host residents has also increased. NYU Lutheran noted an increasingly higher percentage of females entering their residency programs and also commented on observing greater ethnic diversity among applicants.

NYU Lutheran conducts surveys every 2 years to track the practice patterns of their alumni. About one-third of graduates are practicing in a public health setting either part- or full-time, possibly due to the fact that the dental residency program exposes dental students to the benefits and challenges of practice in the safety net.

The AEGD program at LFHC benefits residents and faculty as well as patients through digital network connections that simultaneously enhance access and learning through networks of students and practitioners. LFHC's embrace of the technological opportunities stands as an example of how dental students can be exposed to and learn from a diverse patient population as well as one another.

Polk County Teledentistry
Independence and Salem, Oregon

- The teledentistry program in Polk County, Oregon, is the result of local, regional, and state efforts to improve the availability of oral health services for children from low-income families.

- The pilot program is supported by a grant from the Oregon Health Authority and the Oregon Office for Rural Health, using federal funds from the State Innovation Model (SIM) grant for Oregon.

- The teledentistry program is modeled on the Virtual Dental Home (VDH), a pioneering teledentistry project conceived and implemented in California by Dr. Paul Glassman, who is a consultant to the Oregon demonstration project.

- The teledentistry pilot program, which began in the fall of 2015, has had significant success engaging patients, serving more than 400 children to date.

- Children enrolled in 3 elementary schools in Polk County currently benefit from the oral health services available through the program. Teledentistry services will be expanded to include both the middle and high schools in Polk County as well as several schools in neighboring Yamhill County for the 2016-2017 academic year.

Background

The teledentistry program in Polk County, Oregon, is the result of local, regional, and state efforts to improve the availability of oral health services for children from low-income families. The pilot program is supported by a grant from the Oregon Health Authority and the Oregon Office for Rural Health, using federal funds from the State Innovation Model (SIM) grant for Oregon. Five SIM grantees are working in various areas of telehealth. The teledentistry project, which began in the fall of 2015, has had significant success engaging patients, having served more than 400 children to date. The telehealth projects are overseen by the Oregon Health Authority's Transformation Center.

The teledentistry program is modeled on the Virtual Dental Home (VDH), a pioneering teledentistry project conceived and implemented in California by Dr. Paul Glassman, who is a consultant to the Oregon demonstration. Constituent groups involved in directing the Oregon project include the Oregon Health Sciences University School of Dentistry, Capitol Dental Care, and community leaders. School district personnel in Polk County, where children enrolled in 3 elementary schools currently benefit from the oral health services available through the program, are also instrumental in the current success of the teledentistry pilot. Teledentistry services will be expanded to include children in both the middle and high schools in Polk County as well as several schools in neighboring Yamhill County for the 2016-2017 academic year. In addition, during the summer months when schools are closed, the teledentistry program will locate in a pediatric group medical practice to provide oral health services to patients in that practice.

An expanded-permit dental hygienist (EPDH) working at Capitol Dental spearheaded the teledentistry program in Oregon after hearing a presentation by Dr. Glassman on the concept of the VDH about 6 years prior to the implementation of teledentistry in Polk County. Providing teledentistry services to children in Oregon seemed an especially appropriate intervention to improve access to oral health services in certain rural parts of the state, especially in areas with an insufficient number of dentists willing to serve Medicaid-eligible children. Interest in the VDH from a faculty member at the dental school spurred development of a consortium to consider the usefulness of teledentistry in rural Oregon.

Enabling Factors

Environmental circumstances and regulatory factors in Oregon were conducive to introducing a teledentistry pilot project to determine if the modality would favorably impact access to oral health services and improve oral health outcomes for rural populations. The Medicaid dental benefit for adults in Oregon had previously been reduced to an emergency-only benefit but was expanded to a full benefit after the Affordable Care Act became effective in 2014, allowing more adults and children to enroll in the program.

The administrative structure of Oregon Medicaid was another facilitating factor for the demonstration project. The Oregon Health Authority, which oversees the Medicaid program, subcontracts with 16 coordinated care organizations (CCOs) across the state to manage health services provision, including medical, behavioral, and oral health, for Medicaid-eligible people. These CCOs subcontract with dental service providers throughout Oregon to provide and manage oral health services for the CCOs' enrollees.

Capitol Dental Care in Salem, Oregon, in the Northwest region of the state, is a subsidiary corporation of the dental support organization (DSO) Interdent. Capitol Dental, which is a group dental practice, has current contracts with 15 of the 16 CCOs in Oregon to manage provision of oral health services for some or all of their Medicaid-eligible populations. Capitol Dental receives a per-member per-month capitation fee to provide oral health services to attributed lives. CCOs contract with a single or multiple dental service providers to manage oral health service delivery for enrollees; together, Capitol Dental and Advantage Dental are responsible for dental services for 60% to 70% of the Medicaid-eligible population in the state.

Capitol Dental's substantial market penetration was another enabling factor for the teledentistry project, as many of the children in the program's proposed catchment area were already attributed to Capitol Dental. In 6 counties adjacent to Marion County where Capitol Dental is headquartered, 70% of the Medicaid-eligible population is enrolled with Capitol Dental for dental service management. Assignment of patients to Capitol Dental is both passive and deliberate. Some CCOs allow enrolled patients to select their DSO, while others assign patients to contracted DSOs.

Capitol Dental was formed as a group practice in the early 1990s by a Salem dentist who was treating large numbers of children insured by Medicaid in his private practice. Capitol Dental was organized to engage other dentists in the geographic area to also provide care to this population. Serendipitously, Capitol Dental's founding dentist was also directly involved with the creation and implementation of the Oregon Health Plan, the state's Medicaid program. Coincidental to founding Capitol Dental, he helped to grow the network of dentists participating in Medicaid across the state.

In 1998, Interdent purchased the Capitol Dental group practice. Capitol Dental currently employs 50 dentists. In addition, Capitol Dental has affiliation agreements with approximately 400 dentists throughout Oregon who retain independent ownership of their private practices but contract with Capitol Dental for administrative and management services. As a result, many of these affiliated dentists are also available to the population of patients within Capitol Dental's purview. Capital Dental currently has more than 300 employees managing care for 300,000 covered lives.

Another enabling factor for a teledentistry program was legislation in the state providing authority for oral health demonstration projects. Senate Bill 738 was passed in 2011 by the Oregon State Legislature authorizing the Oregon Health Authority to approve oral health pilot projects that taught new skills to oral

health professionals, developed new workforce categories, and trained new and existing workers in oral health care roles.[16] Other current demonstrations include a pilot project to support tribal groups' usage of a Dental Health Aide Therapist (DHAT) for oral health service provision in the state.

Capitol Dental had an existing outreach program in Polk County providing oral health services to children in Head Start programs and low-income schools and to women and children enrolled in the women, infants, and children (WIC) program. As a result, Capitol Dental was known to area families, which facilitated parent engagement with the teledentistry program. The children in the program also received prizes for urging their parents to review the permission forms, which further stimulated participation.

The Teledentistry Program

According to case study participants, early prevention and management of disease is an effective way to not only control the costs of care but also improve oral health outcomes. The school-based teledentistry program was described as a fundamental strategy to improve the oral health of Capitol Dental's youngest population. School-based outreach was viewed as a logical intervention, as it reached patients at a lower cost base. Identifying children in need of dentistry who might otherwise not have received services resulted in earlier intervention in the disease process and avoidance of more expensive or intrusive dental services. Case study participants noted that, while outreach efforts might initially increase utilization and volume of services and, thus, costs of care, over time, as children's oral health was routinely managed, demand for less costly preventive care would increase and the need for costlier therapeutic and treatment services would decrease.

Independence, a town in Polk County, Oregon, was selected as the first site for the teledentistry project. Several factors favored this location. Independence is a rural area that is mainly agricultural. The availability of oral health services was limited, as no dentists in the town served Medicaid-enrolled patients. Four dentists practiced in the area; only one treated a very limited number of Medicaid-insured children. Children were, therefore, transported to Salem—a distance of about 20 miles—for dental services.

Independence benefited from a strong base of community support. Town government had established a formal service integration team that met once a month to identify problems within the local community and suggest strategies to effectively address priority issues. Team members represented diverse constituent services, including the police department, the various church communities, the Salvation Army, social service organizations, the schools, and others. The service integration team identified oral health service access for low-income residents as a persistent problem for their community and were actively seeking solutions.

The committee raised money for a new school-based health center that included 2 dental operatories. Various partners contributed resources to establish the health center. Salem Hospital provided the nurse practitioner to staff the health center. Capitol Dental found resources to equip the dental operatories and employed the professional staff that delivered oral health services. Polk County employed the behavioral health professionals to work with patients. The school district supplied the building space and other logistical supports. Dental services are now available 2 days a week in the fixed clinic at the health center.

As a result of identifying the need for a variety of oral health access points, the town was also receptive to establishing a teledentistry program in the elementary schools. The superintendent of schools in Independence was easily engaged with offering school-based oral health services. The elementary school principals were also very helpful to the program by encouraging parents to participate.

The teledentistry program began in September 2015 at Ash Creek Elementary School in Independence. The dental hygienist and dental assistant in the teledentistry program set up portable equipment in a designated area at each site. A bilingual dental assistant who is from the local community escorts each child from the classroom to the operatory and returns the patient to the school room after service completion. The oral health team works through each classroom, seeing children whose parents have provided permission for oral health services.

Each child is visually assessed; the dental hygienist charts probable areas of decay and existing restorations. The patient is asked about tooth pain, about daily hygiene, and when or if the child has ever seen a dentist. An intraoral camera is used to acquire pictures of the mouth, with a focus on visualizing the multiple surfaces and various angles of any teeth with suspicious lesions. X-rays are also taken using a Nomad portable x-ray machine. The dental hygienist provides preventive education, sealants, fluoride, and prophylaxis. Each child receives a new toothbrush, toothpaste, and floss. Each child is also allowed to select several prizes from an available cache.

The teledentistry program uses a store-and-forward concept. The dental hygienist records his or her assessments in a Planet DDS dental record on a laptop; the record, the pictorial images, and the x-rays are then transmitted through the cloud to the consulting dentist, who practices in a Capitol Dental clinic in Salem. All data are encrypted using Denticon software. The dentist reviews all records from the teledentistry program within 24 to 48 hours of acquisition and develops a treatment plan for each child.

Several decisions follow, including where the child is to be treated if follow-up care is needed. Although most children in the program are attributed to Capitol Dental, some are not. Referral options include a clinic in the local community, a dental office or clinic within the Capitol Dental purview, an existing dental home in the local area, a nearby FQHC, or the school-based oral health clinic that is staffed by Capitol Dental.

Decisions are team based and often involve discussion between the dental hygienist and the dentist. Care management is in place; the dental assistant calls parents to discuss any referrals for treatment services. The dental assistant tracks calls and maintains careful records of each conversation, noting where the parent expresses intention to seek care for the child.

Case study participants discussed what they had learned from the pilot. It took several months for the program to reach capacity, as more time was required for enrollment and to establish routine processes to manage services than originally anticipated. The large number of children with a primary language other than English prolonged individual service provision. Capitol Dental engaged a full-time bilingual dental assistant to fluently converse with limited English speakers, which contributed to the cultural competence of the services provided in the teledentistry program. However, the time required to collect and record information was longer for these children than for children who were native English speakers.

In the first 3 months of operation, approximately 5 children were seen per treatment day. Staff hoped to increase this number to 6 children per day as the program became more established and efficient. Each encounter included an oral health assessment, prophylaxis, x-rays, and pictorial images. Between January and March of 2016, 149 students received oral health services through teledentistry in one of 2 elementary schools and in several Head Start programs in Polk County. All children who returned a consent form for services were seen; 53% of those were determined to have healthy mouths and were able to remain in the school setting for subsequent recall services. Children with treatment needs were referred to dentists in the community, at the school-based health center, or in Salem. To date, more than 400 children have benefited from services delivered through the program.

The use of teledentistry services impacted the case mix of participating dentists. It was helpful that dental hygienists in Oregon had a broad scope of practice that enabled the provision of lower-acuity care in the community, reserving the use of dentists for patients in need of referral for more complex treatment services.

Barriers to the Program

Case study participants identified several barriers at the inception of the teledentistry program. It was difficult to gain approval from Capitol Dental's parent organization to use a different software program (Planet DDS) to record teledentistry services than that used in the fixed dental clinics. Planet DDS had customized the patient dental record software for use in Dr Glassman's teledentistry program in California, making it ideal for use in the teledentistry pilot in Oregon. There was concern from Interdent, the managing DSO, about the interoperability of dental records.

Another of the problems that was anticipated and was also encountered in the program was finding referral sources for uninsured children in need of dental treatment services. There were very few providers in the catchment area that offered sliding-fee scales or free services. Capitol Dental was unable to offer those services because of its organizational structure. One identified solution was to refer uninsured children to a FQHC in the region—for example, the West Salem Dental Clinic or Virginia Garcia Memorial Health Center. In addition, the dentist in the teledentistry program provided emergency services when the need for an immediate extraction was acute and no other services were available for the child.

Future Innovations in the Teledentistry Pilot Program

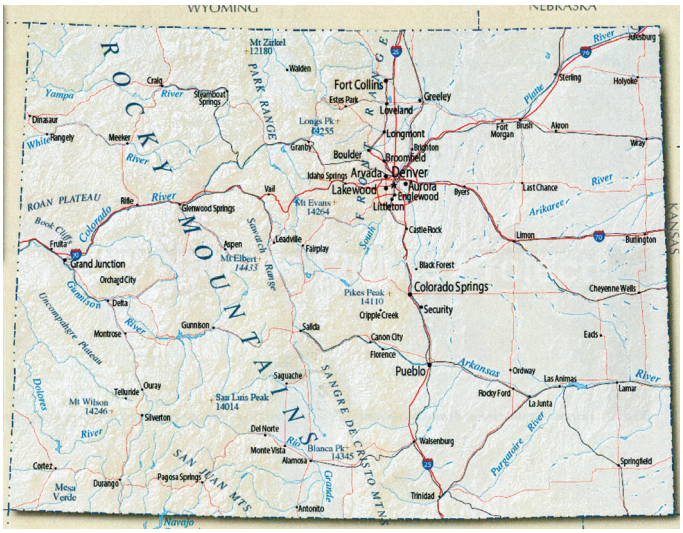
At the time of the case study, another oral health demonstration project was beginning in Oregon to train dental hygienists working in the teledentistry program to place interim therapeutic restorations (ITR). EPDHs working in the teledentistry pilot program will be permitted to use hand tools to debride a tooth and place an ITR once a dentist has determined its necessity. If initial implementation proves successful, the teledentistry program will be allowed to expand this service to other sites.

Training began in June 2016. The EPDH was required to successfully place 10 restorations under direct supervision of a dentist before placement would be allowed at a site at which no dentist was present. The anticipated process was described as follows: A child would have an initial visit with the dental hygienist to assess oral health status and to acquire images and x-rays. The records would be forwarded to the dentist to develop a treatment plan and determine the need for an ITR. Placement of the ITR would occur at a recall visit with the child after parental consent was obtained.

Sunset for the state's pilot authority for oral health projects was recently extended from 2018 to 2025, providing the various teledentistry projects in Oregon with several years to collect data to demonstrate outcomes from the various interventions.

Senior Mobile Dental
Colorado Springs, Colorado

- Senior Mobile Dental was founded in 2006 as an independent dental hygiene practice to provide preventive oral health services for residents of skilled nursing facilities. It is now a full-service dental provider operating in a fixed dental clinic and in mobile programs in community settings.



- Senior Mobile Dental provides oral health services in Colorado Springs, Pueblo, and Denver, Colorado.

- Senior Mobile Dental has expanded its original focus to now include any low-income adult aged 18 years or older, but the majority of the patient population continues to be older adults.

- Teledentistry has been used since 2013, when the fixed dental clinic was opened, making dentists available to provide treatment planning for nursing home patients, rural patients, and others experiencing a barrier to accessing oral health services.

- The organization uses a store-and-forward method in which images and dental records are acquired and stored for subsequent treatment planning by a dentist. Preventive services are provided in community settings, including nursing homes and a municipal housing authority site. Treatment services are available in both the fixed clinic and through portable service delivery.

About the Organization

Senior Mobile Dental was founded in 2006 as an independent dental hygiene practice to provide oral health services to nursing home residents in Colorado Springs, Colorado. The founder recognized that many in that population suffered from oral neglect and many also experienced rampant decay. Preexisting conditions—including use of medications that caused dry mouth, cognitive impairments that caused anxiety and confusion, and overactive gag reflexes that made it difficult for assistive personnel to help with routine oral hygiene—placed nursing home residents at high risk for declining oral health. In the beginning, the dental hygienist contracted with several nursing homes to provide oral health assessment and screening services and preventive and prophylactic oral health care for residents using portable equipment.

The organization, which is incorporated as a not-for-profit, has subsequently grown in focus and scope to now include a full-service dental clinic as well as portable oral health services. Senior Mobile Dental shares a fixed dental clinic with 6 operatories with Mission Medical services, a faith-based organization that provides both primary medical and dental services to its constituents. Senior Mobile Dental occupies the clinic on days opposite Mission Medical. On the alternate days, Senior Mobile Dental staff are providing portable services in several community locations.

Portable dental services are offered both locally and in other areas of the state, including:

- In the Denver metropolitan area, in space rented from one of the senior housing authorities
- In Pueblo, in an established private dental office in a clinic area located in a previously vacant wing of the practice
- In 4 nursing homes in the Colorado Springs metropolitan area
- In rural regions in the catchment area in partnership with community centers where local residents congregate

While Senior Mobile Dental now provides services to any low-income adult aged 18 years or older, the majority of the patient population continues to be older adults.

In the first years of Senior Mobile Dental, the founding dental hygienist was the sole service provider. She would situate portable equipment in a nursing home, assess patients, and provide preventive and prophylactic services, including fluoride application. She would also establish and maintain a dental record for each patient for insertion in the patient's medical record. Placing the dental record in the medical chart assured that the medical director of the nursing home had immediate access to the information.

In 2012, a dentist who was treating mutual nursing home patients began working directly with Senior Mobile Dental to provide treatment services to patients. Subsequent strategic planning allowed the program to expand operationally and to substantially increase its scope of services. It is now a full-service dental provider employing 3 part-time dentists, a full-time dental hygienist, a dental assistant, an on-call dental assistant, and a denturist, as well as executive staff and office management personnel, several of whom are also trained as dental assistants with the ability to provide fill-in services as needed.

The organization recently acquired a wheelchair-accessible van equipped with a Panorex machine (panoramic radiograph) to enable mobile diagnostic services. This machine is especially useful for the elderly population, some of whom are sensitive to having bitewing x-ray sensors in their mouths for prolonged periods. The Panorex requires the patient to bite a small probe while the machine rotates around the head for approximately 10 seconds; the resulting images provide a 2-dimensional view of the full mouth. Patients in wheelchairs can be easily imaged in the van.

Program Expansion

Senior Mobile Dental's program expansion to sites other than nursing homes has been mostly successful. The strategy of locating a dental clinic in a housing authority seemed appropriately aligned with the goal of making oral health services readily available to low-income seniors. The entire dental team, including a dentist, dental hygienist, dental assistant, and program support staff, travels each Tuesday to the housing authority site in Denver to provide a full range of diagnostic, preventive, and treatment services.

However, while initial outreach to the resident population was quite successful—easily filling appointment times since 2013, when the Denver site was opened—the number of failed appointments and cancellations has recently increased. Providers surmise that many residents have addressed their acute dental needs but are not motivated to comply with standard recommendations for preventive services to maintain oral health. Informants commented that most of the seniors complete their dental treatment plans at the Denver site but fail to appear for routine preventive services. At the time of the interviews, executive and clinical staff were discussing options, including moving to another housing authority site in Denver or altering the frequency of the clinic to once monthly or biweekly.

On the other hand, the fixed dental clinic is fully scheduled. On the day of the case study, the waiting room was fully occupied, mainly by older adults. The clinic is in high demand among the local population and has created needed capacity to address the oral health needs of seniors in the community.

Facilitators of and Barriers to Program Development

Certain regulations and policies in Colorado enabled the founding dental hygienist to organize oral health service delivery to meet the needs of the senior population. Colorado laws and regulations allow for independent dental hygiene practice, dental hygiene ownership of a business, and direct reimbursement for dental hygiene services. Colorado is one of only 2 states that permit dental hygiene diagnosis.

Senior Mobile Dental is incorporated as a not-for-profit in Colorado and is managed by a board of directors; the organization is thus able to hire dentists to provide services to patients. Colorado recently passed legislation for dental hygienists to place interim therapeutic restorations after training and competency testing. The regulations governing this permission are currently in development. Senior Mobile Dental expects to have staff trained to provide this service to patients when needed.

The founding dental hygienist encountered initial resistance from some nursing home administrators who objected that oral health assessment services were useless when the options for treatment services for nursing home patients were so limited. Some felt that oral health services were beyond the scope of necessary care for residents. Nursing home administrators are now more comfortable with the practice and find, in fact, that the program is helpful and necessary for their residents. Case study participants discussed the importance of engaging both nursing home administration and social work staff (who are essential in effecting referrals to community dental homes) in supporting oral health services for nursing home residents. The program is most successful in places where administration and staff are engaged with and committed to helping patients achieve and maintain oral health.

An additional barrier to program success in the early years of Senior Mobile Dental was that Colorado Medicaid provided only an emergency dental benefit for adults, so indigent patients in nursing homes had no means to pay for oral health services. Between 2007 and 2014, Colorado provided coverage for some dental services for Medicaid-eligible residents of nursing homes. A post eligibility treatment of income (PETI) benefit included vision and dental benefits and permitted cost sharing between the Medicaid program and the patient. Nursing home residents who qualified for supplemental security income were not obligated to the cost-sharing requirements of the benefit.

The PETI dental benefit was limited to $570 annually per patient; it was especially important not to exhaust the benefit in the event a patient developed an emergent dental condition that required treatment. As a result, some preventive services were provided free of charge. In addition, receiving reimbursement through the program was a cumbersome process. Each time the dental hygienist provided a service, he or she provided the documentation to the nursing home; the nursing home coordinated billing for services and ultimately processed payment back to the dental hygienist.

In those years, some nursing home residents were enrolled in the Evercare program through UnitedHealthcare. Evercare is a comprehensive special-needs Medicare Advantage plan that includes a dental benefit. Evercare permitted the dental hygienist to provide oral health services to enrolled patients in the nursing homes where the program was operating and reimbursed for those services.

In 2014, when the Affordable Care Act became effective, Colorado began providing a dental benefit in the Medicaid program for qualifying adults aged 21 years and older covering up to $1000 in dental services annually, including diagnostic, preventive, and restorative services, tooth extractions, root canals, scaling and root planing, and dentures. This benefit improved the reimbursement options for Senior Mobile Dental when services were provided to Medicaid-eligible nursing home patients.

Enhancement of the Medicaid dental benefit has been advantageous to seniors residing in nursing homes and also to community-dwelling seniors. Full or partial dentures, which require preapproval, are a periodic benefit available to eligible beneficiaries every 5 years. To qualify for a partial denture, a patient must be missing at least 8 posterior occluding teeth or 1 front tooth. The denture benefit is paid from a fund that is separate from that which reimburses standard Medicaid dental benefits.

One downside of the adult Medicaid dental benefit is that there is an annual dollar limit on oral health services; thus, at the end of the fiscal year, patients who have exhausted their dental benefit do not schedule services. This impacts Senior Mobile Dental in both the fixed clinic and the portable programs because service capacity is not well used during the last months of the state's fiscal year. Senior Mobile Dental's patients are largely low-income adults; as such, the organization is heavily dependent on Medicaid reimbursement for services, making the cyclical decrease in demand particularly noticeable.

Colorado transitioned administration of the Medicaid dental benefit to DentaQuest, which handles dental benefit coverage and provider credentialing for participating dentists and dental hygienists. Services to seniors in the nursing homes are now billed directly to DentaQuest and reimbursement is sent directly to Senior Mobile Dental. DentaQuest enables seamless administrative processes, so that eligibility and patient history are easily accessed and claims, which are processed through a clearinghouse, are paid in a timely manner. Requests for preauthorization for services are generally returned within 3 to 5 days of the initial request. Appeals are also expedited to make the process timely and reasonable. Informants noted that this was a substantial improvement over the previous contractor who managed the Medicaid program in Colorado. Another factor enabling Senior Mobile Dental to continue to serve mainly Medicaid-eligible patients is that in 2015, payment rates for dental services increased.

One negative feature of the state Medicaid program was the burdensome recredentialing process required once the Affordable Care Act became effective. Senior Mobile Dental now uses a central credentialing agency to complete the complex and time-consuming process.

In addition to Medicaid, Senior Mobile Dental is also a grantee of the Colorado Dental Health Care Program for Low-Income Seniors through the Department of Health Care Policy and Financing. The grant provides funding for dental services to low-income seniors aged 60 years and older who are ineligible for Medicaid. Grant funds cover the cost of services for certain procedures, while copays are recommended (but not obligatory) for others. Services provided to seniors under the grant are block invoiced to the program. The program includes all basic dental services, including restorations/fillings and scaling and root planing when needed. Cosmetic services such as crowns and bridges are not covered. The program also funds transportation to dental appointments for seniors who qualify.

Teledentistry

Teledentistry has been used by Senior Mobile Dental since 2013, when the fixed dental clinic opened and dentists were hired to provide treatment services, making dentists available to provide treatment planning for nursing home patients. The organization uses a store-and-forward method in which images and dental records are collected and stored for subsequent treatment planning by a dentist.

In the beginning, the dental hygienist used a Nomad portable dental x-ray machine to collect images from patients' mouths. However, some nursing home residents were unable to keep bitewing x-ray sensors in their mouths for the time required to capture the necessary images. A recently acquired van equipped with a wheelchair ramp and a Panorex machine allows nursing home patients to receive diagnostic services in a minimally invasive way. Senior Mobile Dental supplies a wheelchair to transport the nursing home patient to the van to receive diagnostic services. The patient is generally accompanied by a certified nurse aide.

The appointment to acquire x-ray images is scheduled separately from any clinical oral health services. This allows for more efficient use of the Panorex equipment. Images are acquired and stored and then downloaded remotely by a dentist for treatment planning. Dental hygiene services are provided using portable equipment in the nursing home, and necessary treatment services are provided in the fixed clinic (unless the nursing home resident has a dental home in the community). Any dentist with permission to access patient records can log in to the dental record system to view images and effect treatment planning services.

Acquired images meet DICOM standards, so the quality and integrity of those images is maintained during transmission. Senior Mobile Dental uses Open Dental software to chart patients' oral health history and status. The software contains modules for scheduling appointments, charting and treatment planning, image storage, cataloging family and patient histories, and billing and account management. The software is certified as meeting standards for meaningful use and also bridges with the software programs used for image acquisition and storage.

In the beginning, Senior Mobile Dental used Patterson Dental software to upload images, but as that software was incapable of converting x-rays into digital images, the program was abandoned. Initially, patient records were entered into a Planet DDS program, but that software did not allow for charting decay at the gum line, which is an extremely common condition in the elderly.

Teledentistry enables diagnosis and treatment planning while the patient remains in the community and eliminates the need for unnecessary transfers. In addition, teledentistry allows providers to expand their reach into rural areas and nursing homes. Dental hygienists in the program can perform oral assessments for patients who remain in their wheelchairs and can even provide some preventive services if the wheelchair reclines. However, many of the patients are capable of transferring to and sitting independently in a portable dental chair.

Case study participants offered that, in their experience, many nursing home residents had good oral health before entering the skilled nursing facility. The decline in rates of edentulism in the elderly population is an indicator that older people previously received care to preserve their teeth. The amount of plaque on a patient's teeth is also an indicator of oral history. Much of the debris in the mouths of the seniors in the nursing homes where Senior Mobile Dental is present is not yet calculus, which would be an indicator of long-term neglect of the oral cavity. However, some residents have such thick plaque that providers are concerned about the potential for it to break away and cause aspiration pneumonia. That possibility alone is a reason for providing routine preventive services to nursing home residents.

Nursing home patients provide a special challenge for oral health providers because many are lacking in physical stamina and in the ability to tolerate prolonged dental services. Informants suggest that, in many cases, the focus of treatment plans must be palliative care. Expecting nursing home patients to complete a dental treatment plan that involves extensive reparative procedures is unrealistic in many cases. The more thoughtful approach is to effect services to manage pain and avoid infection.

While some nursing home residents have many broken and/or decayed teeth, these teeth are not necessarily painful or infected. The body calcifies nerves and nerve canals as a protective mechanism; thus, not all damaged teeth are painful or dangerous. The philosophy of Senior Mobile Dental is to keep existing teeth free of plaque, to routinely apply fluoride, to encourage daily oral hygiene, and to effect treatment services that are necessary to relieve pain or avoid systemic infection.

Patients in the nursing homes are seen on a 3-month recall basis, and all records are provided to the nursing home for inclusion in the patient's health record. Senior Mobile Dental also provides the federally required oral health assessment for new residents in the nursing homes at which it has contracts to provide services.

Benefits of Teledentistry

Senior Mobile Dental finds that teledentistry services are effective for their patient population. Case study participants commented that teledentistry services are particularly useful for the elderly population because of their mobility limitations. Teledentistry services reduce the cost and inconvenience of transporting frail seniors to dentists' offices or emergency departments where they must wait for services; once examined and assessed, they must repeat the process to obtain any treatment services.

One case study participant described the benefits of teledentistry as follows: The value of teledentistry is that you are able to get care to those who otherwise cannot get care, and in so doing, you avoid the results of dental neglect. The modality is about increasing access, and it is apparent that this is important on many levels. Some patients have not seen a dentist in 20 or 30 years, and all wish they had been seen sooner, as they might have avoided losing teeth and suffering pain and would have had a better overall oral health outcome. Teledentistry also reduces the effect of cultural differences that often keep patients out of private practices. Finally, it removes the patients from demanding financial decisions that might be pressed upon them for treatment services that may not be completely necessary.

One of the dentists working in the teledentistry program was questioned about the quality of the images transmitted for evaluation. The dentist expressed confidence that 95% of oral disease was captured through the x-rays and that the quality of the images allowed for thoughtful treatment planning prior to initiating therapy. Informants also discussed a cell phone application, OralEye, which can be used in place of an intraoral camera to capture suspicious lesions and areas of decay. OralEye is available only for iPhones, iPads, and iPods.

Barriers to Improved Oral Health in the Population Served by Senior Mobile Dental

Informants were asked to discuss barriers to improved oral health for the elderly population. Case study participants identified the high turnover rate among direct-care and administrative staff in nursing homes as problematic. New staff require ongoing education around the importance of oral health services, and new administrators must be reengaged with providing oral health services to residents. In addition, some nursing aides fail to understand the importance of keeping the mouth healthy in frail patients and, as a result, are resistant to providing tooth brushing services for these patients. One informant was a strong advocate for improving the oral health literacy of direct-care workers, suggesting that all certified nurse aide curricula should include modules on the importance of oral health and practical strategies to encourage nursing home residents to permit others to help with brushing their teeth.

As an example of the lack of oral health literacy among some nursing home staff, a case study participant related a recent experience. A new social worker at one of the nursing facilities where the program was

well established telephoned the Senior Mobile Dental clinic to cancel the dental hygienist who was scheduled to arrive the next day to provide services to residents. The social worker explained that there were only a few patients who needed to be seen and that it was not worth the inconvenience to the facility. Nursing home administration was contacted and asked to educate the social worker on the program's importance and the necessity of maintaining residents' oral health.

Financial sustainability is an ongoing concern for the program, which has a heavy reliance on Medicaid reimbursement and state grants as a result of the organizational focus on low-income seniors. The van and Panorex machine were the personal investment of the owners, who considered its potential for senior care worth the expenditure. The van also provides Senior Mobile Dental with the opportunity to further extend the program's outreach to more rural areas of Colorado. At the time of the case study, Senior Mobile Dental was in the process of forming an agreement with another provider group to extend the program to seniors in Minnesota.

Southeast Health District
Waycross, Georgia

- The Southeast Health District in Waycross, Georgia, includes 16 mainly rural counties with a total population exceeding 370,000 people. All but one of the 16 counties in the Southeast Health District is designated as a whole-county Health Professional Shortage Area (HPSA).

- The Southeast Health District began providing telemedicine services more than 20 years ago, in 1993, at 6 access points/endpoints in its catchment area. The Southeast Health District's IT staff currently manages more than 450 endpoints across the state, both in and out of district.

- The teledentistry program now includes 5 endpoints from which a dental hygienist and patient can access one of 2 dentists participating in the teledentistry initiative. The district office acts as the administrative site for the program.

- In the past year, 616 children living in the several counties served by the district received a teledentistry service. Most of the children were from economically distressed families and were Medicaid insured. The program operated for 70 clinic days in the 2015-2016 school year. More than two-thirds of the children seen had some decay; many had never been seen by a provider, while others had not been seen consistently.

About the Organization

The Georgia Department of Public Health provides funding for 18 public health districts, each of which is inclusive of several of the 159 counties and 150 county health departments in the state.[17] The health districts are administrative entities charged with managing the state's health programs in their regions. The Southeast Health District in Waycross, Georgia, includes 16 mainly rural counties with a total population exceeding 370,000 people. All but one of the 16 counties in the Southeast Health District is designated as a whole-county Health Professional Shortage Area (HPSA). Designation as a HPSA is an indicator of an insufficient supply of health and/or dental providers in proportion to the population in a geographic area.

The Southeast Health District receives an annual oral health grant from the state of Georgia that enables the district to hire program staff, including a dental hygienist, to provide preventive and prophylactic services for children in schools in the catchment area. In addition, the district has received additional funding for oral health service delivery through a grant from HRSA. A major goal of the district's oral health program is education, which is provided in Head Start programs and schools throughout the region.

The Teledentistry Program

The Southeast Health District began providing telemedicine services more than 20 years ago, in 1993, at 6 access points/endpoints in its catchment area. The Commissioner of the Georgia Department of Public Health noted the success of the telemedicine program in the district and encouraged expansion of telehealth services across Georgia. The Southeast Health District's IT staff now manages more than 450 endpoints across the state, both in and out of district.

The teledentistry program in the Southeast Health District represents a natural progression from the district's experience with telemedicine. District health management, including the medical director, were aware of significant unmet oral health need in many parts of the district and, after seeing a demonstration of teledentistry services, determined that it might be a useful modality to increase access to oral health services for underserved populations. In 2006, the district applied for and received funding to use teledentistry to screen and assess children in a Head Start program.

The teledentistry program now includes 5 endpoints from which a dental hygienist and patient can access one of 2 dentists participating in the initiative. The district office acts as the administrative site for the program. The participating dentists include a private-practice dentist in Waycross and a pediatric dentist at Augusta University, the Dental College of Georgia in Augusta. Teledentistry services are mainly provided in real time through video conferencing. The dental hygienist also uses a store-and-forward

method, acquiring pictures and oral health history and compiling assessment data for the development of treatment plans by one of the dentists at a later time.

Three counties surrounding Ware County, in which the health district offices are located, were selected as target areas for teledentistry services based on unmet need in the population, insufficient availability of dental providers, and limitations on travel for the local population, including lack of public transportation. The health district's and local health departments' existing relationships with the school districts in these counties were also facilitators for the development of the program, which operates in elementary schools. Dental shortages were evident in the catchment area. In Clinch County, there was a single private-practice dentist; in Brantley County, there was a single part-time dentist; in Charlton County, there was no dentist. In Ware County, where Waycross is located and where some children from Clinch, Brantley, and Charlton received dental services, there were 11 dentists, but fewer than half participated in the state Medicaid program.

Many of the areas served by the teledentistry program are rural and agricultural, and the largest employer in those places is often the school district. CSX Railroad Company and lumber companies harvesting pine for timber and paper pulp operate in the general area. The population is mostly Caucasian or African American.

Services are provided in multiple schools in each of the school districts served by the program. Rather than moving the dental hygienist from school to school, some school districts bus children in need of oral health services to the school in which the dental hygienist has located an operatory. The hygienist mainly provides services for children enrolled in kindergarten to grade 3, although no child is turned away, especially if referred by the school nurse or a teacher.

The dental hygienist in the program began work in the health district with prior experience using the electronic dental record software that is used in the district's teledentistry program and was also already adept at using the intraoral camera, a skill she had learned in private practice. The dental hygienist sees between 8 and 14 children per school day and provides oral health screening and assessment services, prophylaxis, fluoride varnish, and bitewing x-rays, as needed. Sealants are not currently provided in the program. The dental hygienist visits each school for at least a week at a time and follows with a recall visit with every child each year.

In Georgia, in order for the dental hygienist to provide any services to a patient, a dentist must first determine appropriate services. Dental consultations occur in real time; the dental hygiene schedule is coordinated with the dentists' availability during time frames that coincide with the school day. Once the dental consultation is complete and a treatment plan is discussed, the dental hygienist can provide the recommended preventive services.

One of the dentists who participated in the case study explained that he regarded the teledentistry service site as another operatory in his practice, as the consultations were part of his daily schedule; the only difference was that the consultations were provided to a patient in a remote practice setting. During the teledentistry visit, the dental hygienist assesses the patient and images the mouth, and the dentist conferences to discuss diagnosis and treatment planning for the child in real time via video. After the teledentistry consultation and while the dental hygienist is providing the recommended preventive services for the child at the remote location, the dentist is in an operatory in his practice providing services to another patient. The hub location in Waycross (the administrative offices of the health district) provides the connectivity and technical assistance to both remote locations. This organizational scheme increases the capacity and efficiency of the dentist, enabling more patient consultations daily. The arrangement seamlessly integrates teledentistry into the daily dental practice.

Every case is reviewed individually, and a treatment plan is built in real time in cooperation with the dental hygienist. Diagnosis is aided by the pictorial images and through discussion between the dentist and dental hygienist about case history and presentation. The transmission of x-ray images acquired using a digital radiographic system was described as seamless; program dentists commented that both the x-ray and the pictorial images are excellent. Along with charting, the dental hygienist saves the pictures and/or x-ray images to the electronic dental record. At times, images and x-rays require further review and are encrypted and sent through secure email to the consulting dentist.

Outreach to parents is ongoing. Consent forms are sent to homes from the schools, and school nurses encourage families to participate. Staff from the Southeast Health District attend open houses and parent meetings at each of the schools participating in the teledentistry program to provide information and promote utilization of the teledentistry services. In some districts and as necessary, the school social worker personally visits a child's home to obtain consent for oral health services.

Benefits of the Program

Informants remarked that one beneficial consequence of the program was that teachers in the schools are now more aware of their students' oral health needs and often refer children with oral health issues to the dental hygienist. The teacher might notice a child's bad breath (a symptom of decay) or remark that a child was complaining of mouth pain. Some children arrive for dental hygiene services with acute or emergent conditions, including swelling from infection. In such cases, the school nurse and the dental hygienist ensure that the child is sent to a pediatrician or dentist for immediate treatment with medication. Because transportation is an issue for some families, the school staff often provides transport as needed.

Some of the children seen in the teledentistry program had never before seen a dentist. Children found to be in need of follow-up treatment are referred to preexisting dental homes or to local dentists in Waycross, Savannah, or Valdosta who had agreed to treat children referred by the teledentistry program. If a child has a dental home or is uninsured, the program does not bill for the teledentistry consultation. In the opinion of those who administer the teledentistry program and those who deliver the services, it is important to establish and preserve a dental home and to reserve coverage benefits for the services provided in that home.

Each teledentistry encounter is also recorded on a form that describes the services provided and the actions needed. The form is mailed home to parents by the school nurse. When further treatment is necessary, a follow-up form for completion by the treating dentist is included. The form also includes a parent satisfaction survey, which many parents return to the teledentistry program. When requested, records generated from the teledentistry services are forwarded to the treating dentist.

According to case study participants, to be effective, telehealth and teledentistry applications require a team-based approach to care delivery. Professionals must work together to provide high-quality services that are satisfying to both patients and providers. The teledentistry program in Waycross is hiring a dental assistant to work with the dental hygienist in the next school year to perform data entry and sterilize equipment and to escort children to and from the classroom for the oral health services.

Barriers to Teledentistry

One concern about the existing teledentistry program is that there is no dentist employed by the program to regularly provide restorative services to patients in immediate need. Consulting dentists were providing emergency services to patients, but the need was too great for the existing capacity. According to case study participants, the next step to advance the program is to hire a dentist to provide services for children in need of follow-up treatment who had no dental home. In the months prior to the case study, the teledentistry program had actively recruited for a general dentist but had been unsuccessful. Recruiting a dentist to rural Georgia was described as challenging because dental providers are not drawn to practice in rural locations for various reasons.

Infrastructure and Financial Support

The equipment needed for provision of teledentistry services was described as minimal. Access to a broadband connection with enough network speed—at least 1.5 megabits per second (Mbps)—to allow for video transversal streaming is a fundamental requirement. High definition/resolution is important to the visual quality of the transmitted video or x-ray images. Equipment for a single site setup for any telehealth service includes monitors, routers, switches, and peripherals.

The Southeast Health District supplies large carts that hold telehealth peripheral equipment at sites where telemedicine is offered. The peripheral equipment used in the teledentistry program includes a Nomad x-ray with Schick sensors, an intraoral camera, and a laptop equipped with electronic dental record software (Patterson Dental's Eaglesoft Practice Management suite). The x-ray sensors have a USB port that connects by a junction to the laptop computer to allow for image transmission through the broadband network. The consulting dentists can view the x-rays or pictorial images on a desktop, a laptop, or an iPhone. All transmissions are encrypted and HIPAA compliant. Security of health information is a priority in all telehealth service delivery programs managed in the district.

The IT director in the district also manages the use of the expansive telemedicine networks for training and continuing education of clinicians and others across the state. Informants stated that an additional benefit of the telehealth network is the potential for continuing education opportunities for dental professionals.

Informants described teledentistry as an important educational tool for dental students and residents at the Dental College of Georgia, where the pediatric dentist in the teledentistry program is on faculty. His dental students experience firsthand the value of the modality for providing services, especially to certain population groups. Case study participants had hoped to increase interest at the dental college in the usefulness of teledentistry applications, especially for adults. However, the absence of an adult dental benefit in the state's Medicaid program was a major deterrent to establishing teledentistry programs serving adults.

The costs of providing telehealth/teledentistry services are distributed among partners and, depending on the program and the state's involvement, supported through grant funds, programmatic funds, and captured revenue. Funds from the US Department of Agriculture, the Georgia Department of Public Health, the Bureau of Maternal and Child Health, and federal WIC funding have provided support for the telehealth programs, including teledentistry. The program is able to contract with the local dentist and the specialist at the Dental College of Georgia through grant funding. The costs to equip a new access point/endpoint site are approximately $10,000 to $12,000. Replacing a desktop computer equipped with appropriate software at an existing endpoint may cost as little as $2000.

Outcomes

Informants were questioned about outcomes from the teledentistry program. Program staff tracked the number of patients seen in the teledentistry program, the services provided, and the number of clinical referrals, and at the time of the case study were in the process of tracking treatment completion rates in the population. In the past year, 616 children living in the several counties served by the program received a teledentistry service. Most of the children in the program were described as from economically

distressed families and were also Medicaid insured.

Teledentistry services permit early identification and management of emergent problems and mediate extensive unmet need for services in communities where access is limited; the dental hygienist and dentist are able to better manage children at high risk for early childhood caries. Informants commented that the teledentistry program also serves as a nonthreatening introduction to dentistry for young people. Children like seeing their teeth through the camera, and the program gives them a concept of preventive care and education on healthy behaviors.

The teledentistry program in Georgia operated for 70 clinic days in the 2015-2016 school year. More than two-thirds of the children seen had some decay; many had never been seen by a dental provider, while others had not been seen consistently. Referrals to community dentists for these children were challenging, as obtaining dental services for children insured by Medicaid can be difficult. Reimbursement from the Georgia Medicaid program was low and described as a significant deterrent to participation by private-practice dentists. Very minimal increases in reimbursement rates had occurred over recent years. As a result, there has been attrition in the number of Medicaid-participating dentists.

Some children in the teledentistry program had extensive decay that could be treated only at a hospital or ambulatory surgery center; these children were generally referred through the pediatric dentist to the dental college in Augusta for surgical services. A Ronald McDonald House near the hospital in Augusta provides a place where families may stay while obtaining treatment services.

The pediatric dentist affiliated with the program provided specialty dental consultations in Waycross prior to his participation in the teledentistry program. He would travel from Augusta to Waycross approximately once a month to treat children with special needs, including those with autism, cerebral palsy, or syndromic diagnoses. He noted that, during that time, he had observed enormous numbers of children without special needs who also were in need of services. Although the health district was able to find some support to get the most severe cases treated, there were still many children without access. He and others commented that the teledentistry program now permits many of these children to obtain preventive services in a familiar and comfortable environment.

Satisfaction with the teledentistry program was high. Community dentists seemed to appreciate the program's effort to meet the needs of children; dentists also commented that the personnel working in the teledentistry program were cooperative and helpful. The main benefit of the program was that children with significant limitations accessing oral health services were able to receive care through the program. Consulting dentists described high satisfaction with the quality of the teledentistry services, indicating that the images acquired and the information received permitted evaluation very close to, if not identical to, an in-person encounter.

Appendix B

OHWRC
Oral Health Workforce Research Center

Case Studies of Teledentistry Programs in States

Conducted by:
The Oral Health Workforce Research Center
The Center for Health Workforce Studies
University at Albany, School of Public Health
1 University Place, Suite 220
Rensselaer, New York 12144

Contact: Margaret Langelier (margaret.langelier@health.ny.gov)

Thank you for agreeing to participate in this project about teledentistry programs in the US. Your program was selected because of its innovative approach to oral health service delivery using technology to enable consultation between patients and providers or general dentists and specialists, to increase access to oral health diagnostic or specialty services, to use the skills of the oral health team in remote locations to enable appropriate care delivery, and to facilitate referrals to treatment services. This project will include onsite visits at both the base and remote teledentistry program sites by researchers from the national Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS). Project staff will conduct individual or group interviews with as many of the following stakeholders in your organization as possible:

- The project director
- The project administrator
- Technical staff
- Clinical staff, especially dentists, at the base site
- Clinical staff at the remote site
- Program directors at the remote site (eg, Head Start program director)
- Other participants with knowledge of the program, to be identified by each teledentistry program

The interviews will be scheduled to accommodate work or clinical schedules. The following questions will guide the interviews. However, only some of the questions on this protocol will be addressed in each of the interviews, as not all questions are relevant to all interview participants.

Questions for Teledentistry Programs

This project is being conducted to inform a review of the use of teledentistry to improve access to oral health services. The research is conducted by researchers from the national Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) at the University at Albany. The work is funded by the National Center for Health Workforce Analysis in the US Health Resources and Services Administration (HRSA). This interview is voluntary and, with your consent, will take approximately 30 minutes to 1 hour to complete. If this interview is conducted in a group, it will take approximately 2 hours to complete. Please tell us at any point if you wish to or must discontinue this interview.

Project staff will take written notes about this interview that will subsequently be stored in a secure location. Do you have any objections to this format?

Although the following questions are designed to guide the interview process, only some of the questions may be asked depending on the time allotted. A report on the interviews will be compiled when all interviews are complete. The report will provide no information that could be specifically linked to you. Any personal information provided during the interview will be confidential. The report will comprise a summary chapter followed by a series of briefs specifically describing oral health services delivery in each of the teledentistry programs participating in these case studies, including the technology used, program financing, clinical and program staffing, and outcome measures, when available. The summary chapter will describe common themes from the interviews and novel or innovative teledentistry solutions that have resulted in increased access to dental services. Do you have any questions or concerns about this interview before we begin to talk?

Questions

Teledentistry base site

1. Please tell me about your organization.

2. Please describe the geographic catchment area.

3. Are oral health services delivered at this site?

4. Please describe the types of dental professionals in the organization.

5. Does your organization offer either or both primary and/or specialty dental services?

6. Are there special populations served by this organization that have limited access to oral health services? What are the barriers to oral health services for these populations?

7. Please describe the use of technology in your organization, with special emphasis on programs and initiatives that involve both patients and providers.

8. Please describe your EHR system and its role in enabling clinical decision-making by providers in both local and distant locations.

9. How do clinicians use EHR functionalities to communicate about patients?

10. Does your EHR system include a patient portal? If yes, how is that portal configured? Does it allow for patient and provider communication in real time?

11. Does your organization have an established referral network for specialty dental services?

12. Does your organization use any video or camera technology to interface with distant providers and/or patients? If yes, please describe its use and purpose.

13. Why was this technology chosen?

14. Are teledentistry consultations provided in real time, or do you use a store-and-forward process for consultations?

15. What are the benefits of teledentistry? How does it facilitate access to services?

16. Does your organization bill any medical insurance for any teledentistry activities? If not, how are teledentistry services funded?

17. Does your organization expect to continue to provide teledentistry services in the future?

18. Will teledentistry services be expanded to include other populations or applications? How would expansion benefit patients?

19. What are the limitations of teledentistry services? Are teledentistry services more useful for particular populations (eg, children) than for others?

20. Is there anything we have not discussed today about your program that you feel is important for me to know?

Teledentistry remote site

21. Please tell me how long you have been providing teledentistry services at this location.

22. What enabled the teledentistry project (eg, grant funding, a demonstration project, purchase of new technology)?

23. Please describe the innovative technology that is used to provide teledentistry services.

24. What type of oral health professional manages/uses the technology at this site? What type of professional interfaces with the technology at the base location?

25. What are the benefits of using technology to provide oral health services? What are the limitations to teledentistry applications?

26. Are patients receptive to receiving teledentistry services?

27. How often are oral health clinical services provided to patients at this remote site? What types of services are available at the base site? At the remote site?

28. How often and how far must patients travel to address oral health conditions diagnosed during teledentistry consultations with specialty providers? Do patients generally comply with specialists' recommendations?

29. Do teledentistry services offer a means for a dentist at the base site to meet supervision or initial patient visit requirements for services provided by auxiliary oral health professionals at the remote site?

30. How does teledentistry facilitate access to services?

31. Do you envision other applications of teledentistry in the future that might benefit your patients?

32. Is there anything we have not discussed today about your program that you feel is important for me to know?

If you have any questions about this interview at any time, please contact me (Margaret Langelier) at margaret.langelier@health.ny.gov or by phone at (518) 402-0250. If you have questions about your participation as a research subject, you may contact Tony Watson, New York State Department of Health, Institutional Review Board, at (518) 474-8539 or via email at tony.watson@health.ny.gov.

Appendix C

STATE TELEHEALTH POLICIES

State	Telehealth Legislation	Cross-state Licensing	Teledentistry Included	Teledentistry Separate	Telehealth Modality	State Required License	Reimbursement	Telehealth Regulations and Rules
Alabama	Yes	Yes	No	No	Real-time	Yes	Medicaid	AL Admin Code 540-X-15; AL Admin Code 540-X-16; AL Admin Code 630-X-13-.02; AL Sec 34-24-502-507; AL Act 2015-197
Alaska	Yes	No	No	No	Real-time, store-and-forward, self-monitoring	Yes	Medicaid	AK Admin Code, Title 7, 12.449; AK Admin Code, Title 7, 110.65(a); AK Admin Code, Title 7, 110.630; AK Admin Code, Title 7 110.635; AK Admin Code, Title 7, 110,625(a); AK Admin Code, Title12, Sec 40.967; AK Stat Sec. 08.64.364; AK Admin Code, Title 7, 135.290
Arizona	Yes	Yes	No	No	Real-time, store-and-forward	Yes	Medicaid and commercial	AZ Revised Statute Sec 36-36-1; AZ Admin Code, Sec R20-1902; AZ SB 1353; AZ Rev Stat, Sec 32-3251(15); AZ Admin Code, Sec R20-6-1915; AZ Stat 20-841-09; AZ Bill SB 1282; AZ Admin Code Sec R20-9-1902; AZ Rev Stat Sec 32-1401; AZ Rev Stat Sec 36-3602; AZ Rev Stat, Sec 32-1421; AZ Rev Stat, Sec 36-3604
Arkansas	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	AR Code 23-79-1601, 016-06-06; Code of AR Rules and Regulations (CARR) 024; AR Code 23-79-1602(c)(1); AR Code 17-80-117(e)(1); AR Code 23-79-162; AR Code 17-80-117(b)(4)(A); AR Code Ann Sec 17-92-1003; AR Code 17-80-117(b); AR Code 17-80-117(c)(1); 016-06 Code of AR Rules and Regulations (CARR) 036, 17-80-117(d)(1)(2); AR Code Rev 17-95-206; AR Code 23-79-1602(c)(1); AR Code 23-79-1602(d)(3); AR Code Sec 17-100-103; Title 17.100-202, Sec 12; AR Bill SB 53
California	Yes	N/A	Yes	Yes	Real-time	Yes	Medicaid and commercial	CA Business and Professions Code, Sec 290.5; CA Code of Reg, Title 10, Sec 6410; CA Health and Safety Code, Se. 1374.13; CA Business and Professions Code, Sec 2290.5; Sec 14132.725 of Welfare and Institutions Code; CA Business and Professions Code Sec 2242.1(a); CA Code of Reg, Title 16, Div 39, Art 8, Sec 4172, AC 250; CA Business and Professions Code, Sec 2290.5; Welfare and Institutions Code Sec 4512, Title 16, Div 39, Sec 4172, AB 1174
Colorado	Yes	No	No	N/A	Real-time, remote monitoring	Yes	Medicaid and commercial	CO Rev Stat 12-36-102.5; CO Rev Stat 10-16-123(2)(h)(4)(e)(I & II); 7 CO Reg, Rule 18; 6 CO Reg, Rule 1011-1, Ch 5; CO Rev Stat 10-16-123; CO Rev Stat 123(2)(a); CO Rev Stat 25.5-5-320; CO Rev Stat 25.5-5-321; 10 CO Code Reg 2505-10; CO Code of Reg 719-1; CO Rev Stat 10-16-102; CO Rev Stat 12-36-106(1)(g)
Connecticut	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	CT Public Act 15-88; CT Gen Stat 17b-245c; CT Public Act No. 15-88, SB 467; CT Gen Stat 7b-245c; CT Gen Stat, Sec 20-12
Delaware	Yes	No	No	No	Real-time (audio and video), remote monitoring, store-and-forward	Yes	Medicaid and commercial	DE Code, Title 24, Sec. 2602; DE House Bill 69 (2015), Title 18, Sec 3370 & Title 18, Sec 3571R; DE Code, Title 24, Sec 1702, Sec 502, Sec 701, Sec 1101, Sec 1902, Sec 2002, Sec 2101, Sec 2502, Sec 3002, Sec 3502, Sec 3802, Sec 3902; DE Code, Title 16, Sec 4744, Title 24, Se. 1769; DE Code, Title 24, Sec 1932, 19; DE Reg 191, Title 18, Sec 3770 & Sec 3571R
District of Columbia	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	DC Code, Sec 31-3861
Florida	Yes	No	No	No	Real-time	Yes	Medicaid	FL Admin Code 64B15-14.0081; FL Stat 456.023; FL Admin Code 64B8-9.0141
Georgia	Yes	No	No	N/A	Real-time	Yes	Medicaid and commercial	Code of GA Ann, Sec 324-56.4; GA Rules & Regs (Rev) 360-2-.02; GA Code 360-3.07; OCGA 43-34-31; GA Rules & Regs, 360-3-07

Hawaii	Yes	Yes	No	No	Real-time, store-and-forward	Yes	Medicaid and commercial	HI Rev Stat 431:10A-116.3; HI Rev Stat 457-2; HI Rev Stat 453-1.3; HI Rev Stat 466J-6; HI Rev Stat 453-2; HI Rules 17-1737; HI Rev Stat 329-1; HI Rev Stat 453-1.3; HI Rev Stat, Div 1, Title 20, Ch 346
Idaho	Yes	Yes	No	No	Real-time	Yes	Not defined in statute or regulation	ID Admin Code 16.03.19.681, ID Admin Code 16.03.09, Sec 210, 502, 565; ID Code Ann 54-5603-5608; ID Code 54-1733; ID Code, Title 54, Ch 18
Illinois	Yes	Yes	No	No	Real-time, store-and-forward	Yes	Medicaid and commercial	225 ILCS 60-49.5; IL Admin Code, Title 89, 140.403; IL Admin Code, Title 77, Sec 250.310, 225 ILCS 75.2; IL Public Act 099-0076
Indiana	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	IN Code 25-22.5-14; IN Code 12-15-5-11, 844 IAC 5-8; IN Admin Code, Title 405, 5-38-1; IN Admin Code, Title 405, 5-38-4; IN Code 12-15-5-11; IN Code 27-8-34; IN Code 27-13-22; IN Code 25-1-9.5; IN Admin Code, Title 405, 5-16-3.1; IN Code 12-15-5-11; IN Admin Code, Title 844, 5-3-2; IN Code 25-22.4-14; IN Code 25-1-9.5; IN Code 16-36-1-15; IN Code 27-8-34; IN Code 27-13-7-22
Iowa	Yes	Yes	No	No	Not defined in statute and regulation	Yes	Medicaid	IA Admin Code 751 7.1(8D); IA Admin Code, Sec 441, 78.55(249A); IA Admin Code 653-13.10-11; IA Admin Code 675-8.19 (124, 126, 155A)
Kansas	Yes	No	No	No	Real-time	Yes	Medicaid	KS Admin Reg,Sec 68-2-20
Kentucky	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	KY Rev Stat 310-200; KY Rev Stat 205.510; KY 907 KAR 1:055E; KY 907 KAR 1:055; KY Rev Stat 304.17A-138; KY Rev Stat 205.559; KY Admin Regs, Title 907, 3:170, Sec 3, 3(a), & 4(a); KY 201 KAR 17-110; KY Rev Stat 311.560
Louisiana	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	LA Rev Stat 37:1262; LA Admin Code 46:XLV,75; LA Rev Stat HB 1280, Title 40, Sec 1300.383; LA Rev Stat 22:1281; LA Rev 3701262; LA Rev Stat, Sec 1300.381; LA Admin Code 46:XLV.7511; LA Admin Code 46:XLV.7509; LA Rev Stat 37:1276
Maine	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	ME Rev Stat Ann, Title 24, Sec 4316; Code of ME Rules 10-144-101; 32M RSA Sec 3300-D
Maryland	Yes	MD Rev. Stat. 14-302 exempts physicians licensed in adjoining states from being required to obtain a MD license.	No	No	real-time, store-and-forward, remote monitoring	Yes	Medicaid and commercial	COMAR 10.32.05; MD Dept of Health and Mental Hygiene: "Telemedicine," MD Health Occupations Ann, Sec 2-101; Health General Code 15-105.2; COMAR, Sec 10.32.05.02; COMAR 10.09.49.02; COMAR 30.08.12; MD Insurance Code Ann, Sec 15-139; COMAR 10.09.49.03-07; COMAR 10.09.49.11; COMAR 10.32.05.02; COMAR 10.41.06.04; COMAR 10.32.05.06; COMAR 19.09.49.05; COMAR 10.09.49.07; MD Health Occupations Ann, Sec 14-302; COMAR 10.09.49.05; COMAR 10.09.49.08; COMAR 10.09.49.09
Massachusetts	Yes	No	No	No	Real-time, remote monitoring	Yes	Commercial only	Ann Laws of MA, Ch 175, Sec 47BB; MA Session Laws, Acts of 2012, Ch 224, SB 2400234 CMR 2.01(4)
Michigan	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	MCLS, Sec 500.3476; MCLS, Sec 333.17751; MCLS 550.1401k
Minnesota	Yes	Yes	No	Yes	Real-time, store-and-forward	Yes	Medicaid and commercial	MN Stat, Sec 256B.0622; MN Stat, Sec 256B.0625; MN Stat, Sec 151.37; MN Stat, Sec 147.032(1); MN Stat, Sec 147.38; MN Stat, Sec 62A.672; MN Stat 254B.14, Sec 13; MN Stat 147.032
Mississippi	Yes	Not required when the evaluation, treatment, or script given by an out-of-state physician is done by request/ referral of a MS physician	No	No	Real-time	Yes	Medicaid and commercial	Code of MS Rules 50-013-2635; MS Code, Sec 83-9-351; Code of MS Rules 23-225, Rule 1.1; Code of MS Rules 23-206, Rule 1.9; MS Code, Sec 8309-353; Code of MS Rules 23-225, Rule 2.3; Code of MS Rules 23-225, Rule 1.4(C); MS Code Ann, Sec 41-29-137; Code of MS Rules 50-013-2635; MS Code Ann 23-214, Rule 1.7; MS Code, Sec 23-000-212; Code of MS Rules 23-225, Rule 1.5(B)

Missouri	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	MO Rev Stat 206.670; MO Rev Stat 208.670; MO Code of State Reg, Title 19, 30-40; MO Consolidated State Reg 22:10-3.057; MO Code of State Reg; Title 17, 70-3.190; MO Rev Stat 334.100; MO Code of State Rules, Sec 20, 2150-5.100; MO Rev Stat 335.175.1, MO Rev Stat 376.1900.1; MO Consolidated State Reg 22:10-3.060
Montana	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	MT Code, Sec 33-22-138; MT Code, Sec 37-3-102; MT HB 429
Nebraska	Yes	No	No	No	real-time	Yes	Medicaid.	NE Rev Stat 71-8503 (LB 1076 & LB 257); NE Admin Code, Title 471, Ch 1; NE Rev Stat, Sec 71-8506; NE Admin Code, Title 172, Ch 88, LB 556, LB 257; NE Admin Code, Title 482, 5-004
Nevada	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	NV Bill AB 292; NV Rev Stat Ann, Sec 633.165; NV Bill SB 251
New Hampshire	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	NH Rev Stat Ann 415J(2)(3); NH Bill SB 112; NH Rev Stat Ann, Sec 329L1-c; NH Bill SB 84
New Jersey	Yes	No	No	No	Not defined in statute and regulation	Yes	Not defined in statute or regulation	NJ Rev Stat 45:9-21 (b-c)
New Mexico	Yes	No	No	Yes	Real-time, store-and-forward	Yes	Medicaid and commercial	NM Admin Code 16-10.2.7; NM Stat 59A-22-49.3; NM Stat Ann 1978, Sec 61-6-6; NM Stat Ann, Sec 24-1G-3, 16.5.1.7(DD); NM Stat Ann, Sec 24-25-5; NM Admin Code 8.310.2; NM Admin Code, Sec 8.309.4.16 & 8.308.9.18; NM Admin Code 8.310.2; NM Stat Ann 1978, Sec 61-6-20(B); NM Admin Code 8.310.12.12; NM Stat, Ch 61, Art 10, Sec 19; NM Stat Ann 1978, Sec 61-6-11.1 (sunset date of 7/1/2016); NM Stat Ann, Sec 16.10.2.11
New York	Yes	No	No	Yes	Real-time	Yes	Medicaid and commercial	NYCLS Public Health Law, Sec 2805-u; NY Public Health Law, Art 29-G, Sec 2999-(cc)(dd); NY Insurance Law, Art 32, Sec 3217-h; NY Insurance Law, Art 43, Sec 4306-g; NY Reg, Title 14; NYCRR, Sec 599.17; NY Insurance Law, Art 32, Sec 3217-h; NY Insurance Law, Art 43, Sec 4306-g; NYCLS Public Health Law, Sec 3614; Chapter 550 of Laws of 2014, as amended by Chapter 6 of Laws of 2015 (signed by Gov Cuomo in March 2015); NY Public Health Law, Art 29-G—"Telehealth Delivery of Services" (provides clear definitions to serve as foundation for telehealth practice in NY State [Public Health Law, Sec 2999-cc] and authorizes reimbursement under Sec 367-u of NY Social Services Law [Public Health Law, Sec 2999-dd])
North Carolina	Yes	No	No	No	Real-time	Yes	Medicaid	NC General Stat 130A-125; NC General Stat, Art 3, Ch 143B, Sec 12A.2(B)
North Dakota	Yes	Yes	No	No	Real-time	Yes	Medicaid	NB HB 1038; ND Stat, Sec 54-52.1-04.13; ND HB 1323, ND Stat, Sec 23-43-05; ND Century Code 54-52.1-04.13, Pub L. 10-425; 21 USC 802-803; ND Century Code, Sec 19-02.1-15.1; ND Admin Code 61.5-01-02-01; ND Admin Code 91-01-02-34; ND Century Code, Sec 43-17-21; ND HB 1038; ND Stat, Sec 54-52.1-04.13
Ohio	Yes	Yes	No	No	Real-time	Yes	Medicaid	OH Rev Code Ann 4731.296; OAC 4755-27-01; OAC 4753-1-01; OH Rev Code, Sec 5164.94; OH Rev Code, Sec 5164.95; OAC 4753-2-01; OAC 5160-1; OH Rev Code Ann, Sec 4731.296(C); OAC 4731-11-09; OAC 4731-10-11; OAC 5160-1; OAC 4755-27-01
Oklahoma	Yes	Yes	No	No	Real-time	Yes	Medicaid and commercial	OK Stat, Title 36, Sec 6802 & 6803; OK Admin Code, Sec 317:30-3-27(a), 6804; OK Admin Code, Title 435:10-1-4; OK Admin Code, Sec 317:30-3-37; OK Admin Code, Sec 435:10-7-12; OK Stat, Title 59, Sec 509; OK Admin Code, Sec 317:39-3-27(a); OK Stat, Title 59, Sec 633; OK Stat, Title 17, Sec 139 & 109

Oregon	Yes	Yes	No	Yes	Real-time	Yes	Medicaid and commercial	OR Rev Stat 442.015; OR Admin Rules, Sec 848-040-1080; OR Admin Rules, Sec 847-008-0023; OR Admin Rules, Sec 410-130-9610; OR Admin Rules, Sec 847-025-0000; OR SB 144 (2015), now listed as Ch 340 of 2015 Laws; OR Rev Stat, Sec 743A.058; OR Rev Stat Ann, Sec 677.139; OR Admin Reg 410-130-0610(2)(a); OR Admin Reg 410-130-0610(5); OR Rev Stat, Sec 743A.185
Pennsylvania	Yes	Yes	No	No	Real-time	Yes	Medicaid	PA Stat Ann, Title 63, Sec 422.34(a) & (c)(2)
Rhode Island	Yes	Yes	No	No	Not defined in statute or regulation	Yes	Medicaid	RI General Law, Sec 5-37-12; RI General Law, Sec 5-37-14
South Carolina	Yes	No.	No	No	Real-time	Yes	Medicaid	SC Code Ann, Sec 40-69-20
South Dakota	Yes	Yes	No	Yes	Real-time	Yes	Medicaid	SD Reg 67:40:16; SD Reg 67:40:19:04
Tennessee	Yes	Yes	No	Yes	Real-time, store-and-forward	Yes	Medicaid	TN Code Ann, Title 56, Ch 7, Part 10; TN Composite Rules and Regs 0880-02-14; TN Code Ann, Sec 63-6-209(b); TN SB 1223/HN 699 (2015)
Texas	Yes	Yes	No	No	Real-time, store-and-forward	Yes	Medicaid	TX Admin Code, Title 25, Sec 412.303; TX Admin Code, Title 1, Sec 354.1430; TX Admin Code, Title 22, Sec 741.1; TX Government Code, Sec 531.001; TX Admin Code, Title 40, Sec 362.1; TX Admin Code, Title 1, Sec 354.1432; TX Government Code 531.0216; TX Admin Code, Title 1, Sec 355.7001; TX Government Code, Sec 531.0217; TX Admin Code, Title 1, Sec 354-1434; TX Admin Code, Title 22, Sec 741.214; TX Admin Code, Title 22, Sec 174.8; TX Admin Code, Title 22, Part 9, Ch 180; TX Occupational Code, Sec 111.002; TX Admin Code, Title 22, Sec 174.6; TX Admin Code, Title 22, Sec 172.12; TX Occupation Code, Sec 151.056; TX Insurance Code, Sec 1455.004; TX Government Code, Sec 531.02162; TX HB 1878 (2015); TX Admin Code, Sec 355.7001; TX HB 479 (2015)
Utah	Yes	Yes	No	No	Real-time	Yes	Medicaid	UT Code Ann, Sec 26-9f-102; UT Code Ann, Sec 26-18-13; UT Admin Code R414-42-3; UT Code Ann, Sec 58-1-501; UT Code Ann, Sec 58-67-305; Laws of UT 68-61-307; UT HB 121 (2015); UT Code R432-100-32; Laws of UT 68-60-102; UT Reg Text R398-15-3
Vermont	Yes	No	No	No	Real-time	Yes	Medicaid and commercial	VT Stat Ann, Title 8, Sec 4100; VT Bill S.139 (2015, Act 54); VT Stat Ann, Title 33, Sec 1901k; VT Stat Ann, Title 18, Sec 9361; VT Act No 40 (S.88)
Virginia	Yes	Yes	No	Yes	Real-time	Yes	Medicaid and commercial	VA Code Ann, Sec 38.2-3418.16; VT SB 1227; VT HB 2063 (2015); VA Code Ann, Sec 54-1-3303
Washington	Yes	Yes	No	No	Real-time, store-and-forward	Yes	Medicaid	WA SB 5175 (passed in 2015, to be incorporated into Rev Code of WA, Sec 41.05, 48.43, 74.09, & 70.41.020); WA Admin Code, Sec 182-551-2010; WA Admin Code, Sec 246-915-187; WA Admin Code, Sec 182-531-1730; WA Admin Code, Sec 182-531-0100; Rev Code of WA, Sec 18.71.030
West Virginia	Yes	Yes	No	No	Real-time, store-and-forward, remote monitoring	Yes	Medicaid	WV Code, Sec 30-3-13 & 30-14-12d (SB 47, 2016); WV Code, Sec 30-5-4; WV HB 2496 (2015)
Wisconsin	Yes	Yes	No	No	Real-time	Yes	Medicaid	WI Stat 49.45 (29w)(2); WI Stat 14.89; WI Act 116 (AB 253, 2015)
Wyoming	Yes	Yes	No	No	Real-time	Yes	Medicaid	WY Stat, Sec 33-26-102; WY Stat, Sec 33-40-102; WY Stat Ann, Sec 33-26-402; Code of WY Rules 006-062-001; WY HB 107 (2015); WY Stat 33-26-701-7-3

admin, administrative; ann, annotated; art, article(s); ch, chapter(s); COMAR, Code of Maryland Regulations; div, division; gen, general; HB, House Bill; KAR, Kentucky Administrative Regulations; LB, Legislative Bill; MCLS, Michigan Compiled Laws Service; N/A, not applicable; NYCLS, New York Consolidated Laws Service; NYCRR, New York Codes, Rules and Regulations; OAC, Ohio Administrative Code; OCGA, Official Code of Georgia, Annotated; reg, regulation(s); rev, revised; RSA, revised statute annotated; SB, Senate Bill; sec, section(s); stat, statute(s); svcs, services; USC, United States Code.

Source: Center for Connected Health Policy, National Telehealth Policy Resource Center. *State Telehealth Laws and Medicaid Program Policies: A Comprehensive Scan of the 50 States and District of Columbia*. March 2016.

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