

# Using Telehealth Technologies to Improve Oral Health for Vulnerable and Underserved Populations

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**ABSTRACT** Telehealth refers to the use of technology to provide health care at a distance. The important and increasing role of telehealth in the delivery of health care has been recognized for several decades. Although there are fewer reports on the use of telehealth to deliver oral health services, evidence is emerging that these technologies can enhance the ability of the oral health delivery system to reach vulnerable and underserved populations.

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Several terms have been used to describe the use of technologies that facilitate interaction among patients and health care providers in geographically separated locations. Much of the literature uses the terms “telemedicine” to describe these interactions. In the last decade, the use of these technologies in dentistry has been referred to as “teledentistry.” More recently, these terms have been combined and referred to collectively as “telehealth.”<sup>1</sup>

The important and increasing role of telehealth in the delivery of health care has been recognized for several decades. The California HealthCare Foundation in a 2008 report, “Telemedicine in California: Progress, Challenges, and

Opportunities,” reviewed the history and use of telemedicine nationally and in California.<sup>2</sup> The report described the use of telemedicine technologies to deliver health services in state prisons through regional service delivery mechanisms centered at the University of California, Davis, in outreach systems managed by the Veterans Administration, in outreach managed by rural health centers, and for use in diagnosis and treatment of a wide variety of health conditions.

Delivery of health care using telemedicine technologies is recognized by the federal government as a “cost-effective alternative to the more traditional face-to-face way of providing medical care” due to the ability to provide earlier diagnosis-

tic and preventive services and savings in transportation and other associated costs.<sup>3</sup> The Center for Medicare and Medicaid Services (CMS) has indicated that “for purposes of Medicaid, telemedicine seeks to improve a patient’s health by permitting two-way, real-time interactive communication between the patient and the physician or practitioner at the distant site. This electronic communication means the use of interactive telecommunications equipment that includes, at a minimum, audio and video equipment.”<sup>3</sup> CMS further stated that “states may reimburse the physician or other licensed practitioner at the distant site and reimburse a facility fee to the originating site. States can also reimburse any additional costs such as technical support, transmission charges, and equipment. These add-on costs can be incorporated into the fee-for-service rates or separately reimbursed as an administrative cost by the state.”

A 2008 report, “Meeting the Health Care Needs of California’s Children: The Role of Telemedicine,” by The Children’s Partnership, stated that “Quality health care no longer requires a health care provider and patient to be in the same room at the same time. With the advancement of information and communications technology (ICT), children and adults can receive high-quality health care from a distance through telemedicine. In fact, telemedicine is rapidly becoming a viable solution to meeting the health care needs of patients in rural and other underserved areas.”<sup>4</sup>

California was one of the leading states in adopting legislation to define and support the role of telemedicine in health care delivery. In 1996, California adopted the Telemedicine Development Act of 1996.<sup>5</sup> This law put California in the position of national leadership on telemedicine policy and supported telemedicine

as a legitimate means of providing health care. The stated intent of the law was to support the idea that “The use of telecommunications to deliver health services has the potential to reduce costs, improve quality, change the conditions of practice, and improve access to health care in rural and other medically underserved areas.”

Common applications of telehealth include videoconferencing between a patient and health care provider for a consultation or among groups of patients or providers for education, support, and

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care coordination; transmission of data, such as X-rays, photographs, video, and audio files; remote monitoring of vital signs and other health indicators; and Internet applications for patient education and disease management.<sup>3</sup> Telehealth can occur in “real time,” where the patient and his or her provider are at one site communicating with another provider at another site simultaneously.<sup>6</sup> Videoconferencing is the most common real-time telehealth interaction. Telehealth also occurs using “store-and-forward” methods. A store-and-forward interaction involves the transfer of data, such as an X-ray or a digital image, from an originating site to a distant site for review and consultation at a later time. Telehealth also involves the use of an ever-growing menu of software and technological devices, including

videoconferencing equipment; digital cameras; electronic clinical devices, such as digital stethoscopes; and disease management and health education software.<sup>3</sup>

Telehealth has been used in many applications including emergency and critical care, vision screening, mental health evaluation and treatment, telepharmacy, child abuse evaluations, and diagnosis and treatment of a variety of other health conditions.<sup>7-12</sup> A recent study demonstrated a 7 percent lower rate of rehospitalization for patients on home health care regimens who were followed using telehealth technologies versus those in a nontelehealth group.<sup>13</sup> The savings from this intervention were substantial given an average cost of readmission of \$7,200 per person for the group of patients studied.

It has been argued that telehealth is a critical modality to address the severe shortages of health care available for large numbers of people in our society. In California, Medi-Cal has recognized the value of telehealth and reimburses providers who use videoconferencing to provide care. Medi-Cal also provides a facility and transmission fee to the originating site to compensate for the telecommunications and other costs associated with originating a telehealth visit. Medi-Cal also reimburses for store-and-forward applications related to tele dermatology, teleophthamology, and specific types of teleoptometry services.<sup>14-16</sup>

### Teledentistry

Application and use of telehealth in dentistry are not as well-developed as the use of telehealth technologies in other aspects of the health care delivery system. However, telehealth technologies have been available and used in the delivery of oral health services for quite some time. An early report on the use of technology to allow collaboration between distant dental providers described a system in use

by the U.S. Army to transmit still color images over a modem to allow periodontists to view healing after periodontal surgery without the patient having to travel long distances.<sup>17</sup> A series of articles in the February 2000 issue of the *Journal of the California Dental Association* recognized the potential for telehealth but expressed significant caution about how these technologies would develop and be used.<sup>18,19</sup> In spite of the widespread use of telehealth in medicine, there are far fewer reports in the literature on the application of telehealth concepts to the delivery of oral health services. The emphasis of those reports that are available on teledentistry has been on the use of these technologies as a means to share records between dentists and dental specialists or as screening tools to determine the feasibility or urgency of need for dental treatment.<sup>20-25</sup>

There are some more recent reports in the literature that describe the use of teledentistry to facilitate geographically distributed, collaborative dental care. An initiative based out of the University of Southern California demonstrated in 2003 that dentists were able to work with a dental hygienist at a remote location, to decide on preventive services that could be delivered by the hygienist at that location, and to facilitate referrals to the USC mobile dental clinic that delivered on-site dental services at a later date.<sup>26</sup> A 2004 report reviewed the available telehealth technologies and outlined the potential for using these technologies to foster collaboration between dentists and dental hygienists in order to reach and improve oral health of underserved populations.<sup>27</sup> A 2009 review of the uses of teledentistry described both real-time consultations and store-and-forward applications in use at that time.<sup>28</sup> In particular, a system was described in Minnesota where real-time videoconferencing was used to facilitate remote consultations

with dental specialists for temporomandibular disorders, orofacial pain, and oral medicine issues. A 2010 report described the use of teledentistry technologies to triage the need for a referral to a remote oral medicine hospital clinic.<sup>29</sup>

In 2011, a report described the ability of endodontic specialists to remotely locate the canal orifice to assist general dentists in performing endodontic treatments.<sup>30</sup> A 2011 publication described an initiative developed by the Northern Arizona University (NAU) Dental

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Hygiene Department where affiliated practice dental hygienists can digitally acquire and transmit diagnostic data to a distant dentist for triage, diagnosis, and patient referral. Remote general supervision allowed these hygienists to provide preventive services permitted within the scope of their licenses.<sup>31</sup> Although the potential for enhancing oral health care through the use of telehealth technologies is just beginning, these technologies hold great promise in improving the oral health of underserved populations through fostering and facilitating geographically distributed collaborative systems of care.

In 2011, the Institute of Medicine and the National Research Council of the National Academies of Science issued two reports on oral health, “Advancing Oral Health in America” and “Improving

Access to Oral Health Care for Vulnerable and Underserved Populations.”<sup>32,33</sup> These reports emphasize the significant oral health disparities among a number of underserved population groups and call for new methods and systems to address these disparities. There is specific mention of the role of telehealth as a component of future oral health delivery systems that can better reach and serve these populations.

### Teledentistry in the California Virtual Dental Home Project

The virtual dental home project, directed by the Pacific Center for Special Care at the University of the Pacific Arthur A. Dugoni School of Dentistry and described in more detail in other articles in this issue, uses telehealth technologies to facilitate acquisition of records by allied dental personnel, including dental hygienists and dental assistants, in community sites and review of these records by dentists who are not on site. These dentists make decisions about the best course of treatment, and provide remote general supervision of the allied personnel performing preventive and early intervention treatment. The virtual dental home model is being demonstrated in schools, Head Start centers, residential facilities for people with disabilities, and long-term care facilities for dependent and elderly individuals. The techniques and illustrations of the equipment used for capturing telehealth records in a laptop computer in the virtual dental home system are also described in other articles in this issue.

The virtual dental home model uses a cloud-based software system called Denti-con.<sup>34</sup> The software has all the features of a locally installed dental patient management system. However, the data is stored on a secure web server and accessed using a web browser from any location.



FIGURE 1. Restorative chart from the Denticon Electronic Dental Record.

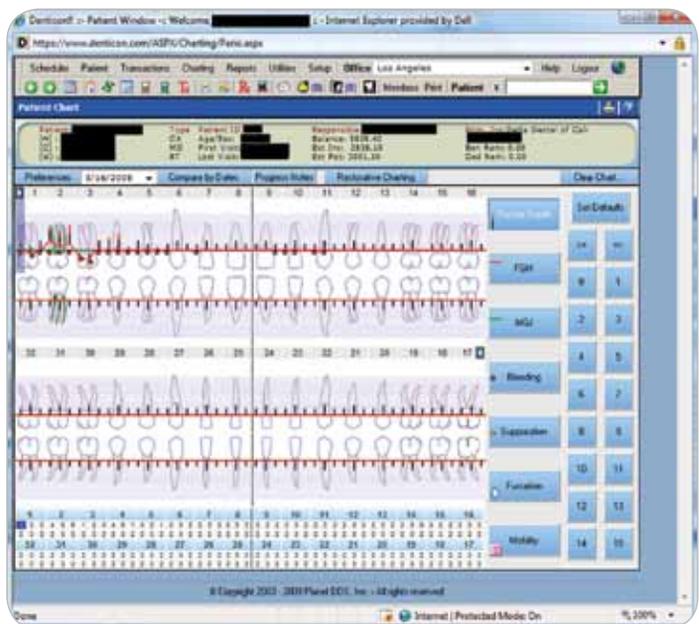


FIGURE 2. Periodontal chart from the Denticon Electronic Dental Record.

This cloud-based arrangement facilitates acquisition of records in one location and review in another. The entire system is fully HIPAA compliant and patient privacy is fully protected. Only users with authenticated credentials can access the system and upload or review records.

FIGURES 1 THROUGH 6 illustrate screen captures from some of the information available in the Denticon web-based software system. As illustrated in these figures, dentists who are reviewing these records have access to electronic restorative and periodontal charts, a system that records carries risk factors and assigns a caries risk score, a system for tracking patient status to facilitate case management, and high-quality radiographs and photographs. Also included in the records, but not illustrated here are treatment plans, patient ledgers, progress notes and other electronic health record (EHR) components. Communication between the allied personnel on-site at the community location, and the dentist off-site in a dental office or clinic, is facilitated by the electronic records described here, and enhanced by

email communication and phone calls that supplement the record review.

Once a dentist has reviewed the records and talked, if needed, with the allied personnel who are on-site, the dentist decides the best course of treatment for that patient. In the majority of cases, these individuals are kept healthy in the community location by preventive and early intervention activities of the allied dental personnel. In cases where the dentist determines that the individual has treatment needs that can only be addressed by a dentist, they are referred to and assisted with receiving treatment in a dental office or clinic. If the treatment is performed by the dentist who reviewed the virtual dental home records then that dentist already has access to records and is familiar with the treatment needs of the individual. If treatment is performed by another dentist, records can be exported from the system and made available. In either case, valuable time is saved at the dental office because diagnostic and preventive procedures have been performed and records are available.

### Application of Teledentistry by Apple Tree Dental

Another example of the use of telehealth technology to facilitate oral health care is the delivery system from Apple Tree Dental (Apple Tree) in Minnesota. Apple Tree is a unique, nonprofit staff-model dental practice that currently operates five regional dental access programs in urban and rural areas of Minnesota. Telehealth technologies link special care dental clinics with on-site dental clinics at schools, Head Start Centers, group homes, assisted-living centers, nursing facilities, and other community sites for people facing physical, financial, and geographic access barriers.

The Apple Tree model links dental hygienists working under “collaborative agreements” with dentists. Apple Tree has demonstrated the ability for a dentist at a distant dental clinic to safely and accurately assess the permanent teeth of high risk children for sealant placement without the need for a face-to-face examination. Dentists made decisions using live videoconferencing, digital radiographs, Diagnostent readings, and high-resolution intraoral



FIGURE 3. CAMBRA risk assessment screen from the Denticon Electronic Dental Record.

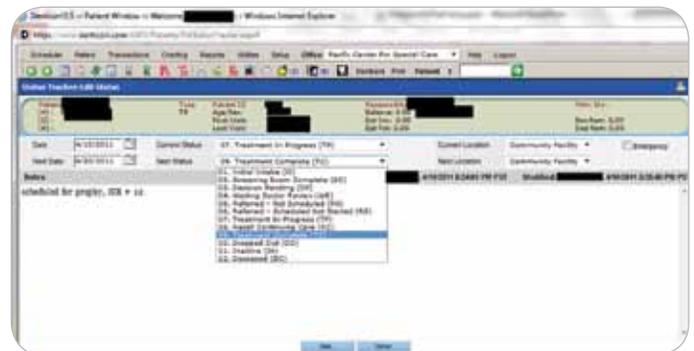


FIGURE 4. Status tracker screen from the Denticon Electronic Dental Record.

video and still images. The decisions they made using the store-and-forward records closely matched the decisions made using live videoconferencing and those made after a second face-to-face examination.

Apple tree is now using oral health assessments and store-and-forward records collected in Head Start Centers and nursing homes and reviewed by off-site dentists to determine what treatment is needed and the best location for treatment of children and vulnerable adults in these locations. Approximately 70 percent of children in the Head Start Centers being served need only preventive services performed by the dental hygienist. For the 30 percent who need treatment by a dentist, this is provided by a dentist who comes on site with portable equipment. The same pattern is followed in the nursing home using Apple Tree's mobile dental office.

### Barriers and Solutions to Adoption and Spread of Telehealth

Even as the use of telehealth technologies is spreading in general health services and delivery of oral health services, barriers remain that are slowing down or blocking the wider-spread adoption of this method of delivering health care. The Center for Connected Health Policy, a nonprofit organization devoted to influencing policy to improve health care delivery in California through telehealth, issued a comprehensive report in 2011, "Advancing California's Leadership in Telehealth Policy A Telehealth Model Statute and Other Policy Recom-

mendations." The report documents the use of and barriers to the spread of telehealth across the nation and proposes a model statute to optimize the use of telehealth in California.<sup>1</sup> The intent of the report was to propose a way to create parity between health services delivered using in-person methods with health services delivered using telehealth methods. The important determinant is whether the service was delivered effectively and not the technologies chosen by the provider to deliver the service.

The report identified multiple barriers to wider deployment of telehealth including confusing or contradictory definitions of telehealth, the uncertainty of payment for services, difficulties in developing and sustaining provider networks, the challenge of integrating technology among providers, and lack of training resources.

The most significant of these is the uncertainty about payment for telehealth services. If providers believe they cannot be paid for delivering services using telehealth technologies, they have little motivation to join telehealth-enabled provider networks or receive training in the use of telehealth technologies.

In 2011, based on the Center for Connected Health Policy's report, California Assemblyman Dan Logue (R-Lake Wildwood) introduced Assembly Bill 415, the Telehealth Advancement Act of 2011.<sup>35,36</sup> Effective Jan. 1, 2012, this new law modernizes California's landmark Telemedicine Development Act of 1996 to reflect advances in the field since the original law's passage. It updates the definition of telehealth to reflect the broader range of services in use today, and allows all licensed health professionals in

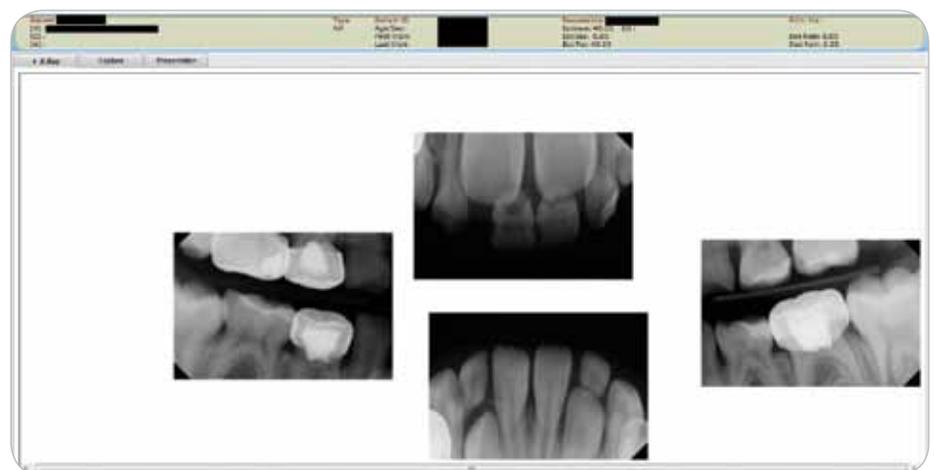


FIGURE 5. Radiographs from the Denticon Electronic Dental Record.

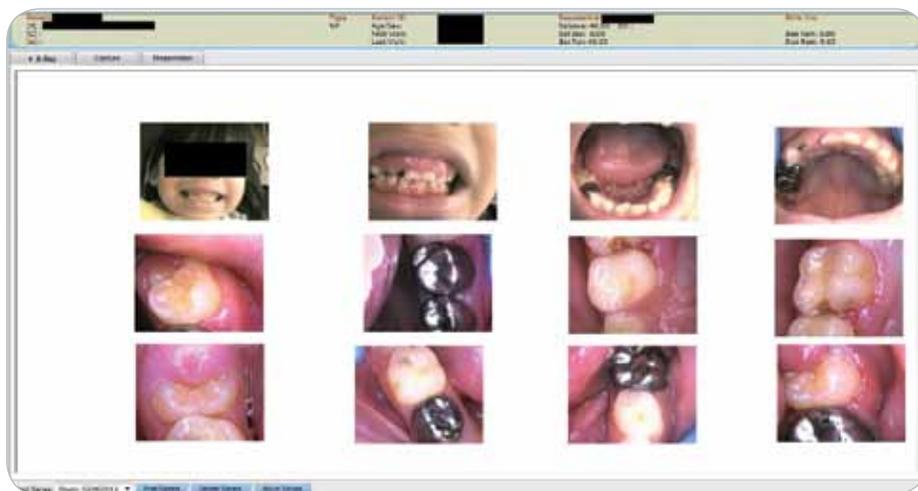


FIGURE 6. Photographs from the Denticon Electronic Dental Record.

California to engage in telehealth. Specific components of the legislation include:

- Replacing the outdated legal terminology of “telemedicine” with “telehealth” throughout California law. This change makes it clear that applications of telehealth technology to the delivery of oral health services are included in all aspects of the law. The law broadens the modalities that are included in telehealth to include multiple forms of electronic or distance communications and explicitly includes store-and-forward technologies in the definition. Telehealth, the new legal terminology, refers to the technology-enabled delivery of services, rather than a specific medical practice. This allows for a far broader range of telehealth services than the old law, and does not limit future telehealth technologies, because of its encompassing, forward-looking definition.

- Removing limits on the physical locations where telehealth services may be delivered. Under the old law, telemedicine appointments had to take place only in licensed health care facilities, such as hospitals or physician offices and Medi-Cal restricted telemedicine delivery to four types of licensed facilities only: hospitals, clinics, physician offices, and skilled nursing facilities. The new law removes limits on the locations for telehealth. This will allow for telehealth to be covered,

regardless of where it takes place. This can include patient care management programs that employ home monitoring devices, in-home patient medical appointments, and physician or dentist reviews of health data in any location in real time and using store-and-forward methods.

- Expanding the list of health professionals who can provide telehealth services to include all professionals licensed under the state’s healing arts statute.

- Removing a previous Medi-Cal regulation requiring providers to document a barrier to an in-person visit before a beneficiary could receive telehealth services, which was widely viewed by providers as a disincentive to its use.

- Removing a previous requirement that patients sign a separate, written, telehealth-specific consent form before any type of telehealth service could be delivered. Providers found that the written consent form stigmatized the use of telehealth, and created an unnecessary barrier to care. The new law replaces the written consent with a verbal consent that must be recorded in the patient’s record. This establishes parity between services provided in person, and those provided via telehealth.

While AB 415 clarified and improved many important areas of telehealth, it did not mandate that Medi-Cal or any other

payers reimburse providers for services delivered using telehealth technologies. It was primarily fiscal considerations that kept full parity in delivery and payment from being included in the law. However, there is increasing evidence that the use of telehealth in the delivery of health services will actually save scarce state resources as well as deliver better health care. For example, the Center for Connected Health Policy in a 2011 report, “Fiscal Impact of AB 415: Potential Cost Savings from Expansion of Telehealth,” has predicted that telehealth has the potential to reduce health care costs in the California Medi-Cal program by several hundred million dollars per year annually if telehealth is utilized to its fullest potential in treatment of cardiac disease and diabetes.<sup>37</sup>

There is also reason to believe that the use of telehealth technologies can save scarce resources in providing oral health to underserved populations. The virtual dental home delivery model is demonstrating the ability to deliver more health per dollar spent than other methods when applied to the state’s most vulnerable populations. The emphasis on prevention and early intervention will have a significant impact on downstream “costs of neglect” for untreated dental disease such as increased costs for more complex dental treatment needed later on, cost of emergency-room visits, cost of care provided in hospital emergency departments and operating rooms, and lost days of work and school from dental pain and infection.

### Future Advancement of Telehealth in Delivery of Oral Health Services

The history and recent advancements in the use of telehealth technologies to improve general health care and oral health care delivery, along with the recent legislation in California, point to an increasing awareness of the importance of these technologies. Given the large

general health and oral health disparities faced by many members of society and the difficulty many populations have accessing the traditional health care system, it is clear that telehealth will have an important and growing place in health care delivery. Demonstration projects, such as the virtual dental home project in California, are already illustrating the value of telehealth systems in addressing the chronic and severe oral health disparities faced by large number of people and the ability to do so in a way that can improve health and lower costs.

To fully realize the potential for telehealth to improve the oral health of vulnerable populations, policy and delivery system reforms are needed to ensure that telehealth delivered or enabled activities are reimbursed in parity with in-person activities that provide the same health service. What is also needed is the expansion of delivery systems that link geographically distributed provider teams and training of current and future providers to use telehealth technologies and work in these teams. New telehealth-enabled delivery systems will help ensure that vulnerable populations can gain access to the oral health care they need by extending the reach of dentists and other oral health providers to locations where they are needed most. ■■■■

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