



Meeting the Health Care Needs of California's Children:



The Role of Telemedicine

“By bringing doctors and other health care professionals to the community, telemedicine delivers high-quality health care for children. Telemedicine is helping us build an efficient health care system organized around meeting the needs of California’s children and families in partnership with local clinicians.”

—Thomas S. Nesbitt, M.D., M.P.H., Executive Associate Dean, Administrative and Clinical Affairs, UC Davis School of Medicine, Director, Center for Health and Technology

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. Telemedicine also brings additional benefits, such as

* Information and Communications Technology (ICT) includes, but is not limited to, the Internet, computers, hardware, software applications, telecommunications technology, advanced media technology, and handheld devices. For the purposes of this issue brief, ICT also includes other technologies utilized for telemedicine and telehealth applications, such as remote monitoring devices, electronic clinical equipment, and other emerging technologies used to improve the health of individuals.

reduced patient costs for travel, reduced absences from school and work to go to medical appointments, health system efficiencies and potential cost savings from improved care management and coordination, and local economic gains as residents remain in the community for care.

Despite the growth of telemedicine in California and nationally and its recognized potential to increase access to and efficiency of delivering health care in rural and other underserved areas, there has been little discussion of how it can and should be used to improve the health care and health of children.

California was one of the pioneers of telemedicine among states, with programs operating in the early 1990s and enactment of one of the first state telemedicine laws in 1996. Today, California has the opportunity to re-establish itself as a leader in telemedicine, demonstrating how to uniquely harness technology to meet the health care needs of its residents.

The Children’s Partnership developed this issue brief to inform leaders and the public of how telemedicine, when applied appropriately, can address the health care needs of California’s children, particularly those who are low income and living in medically underserved areas. This brief provides an overview of the benefits of telemedicine for children and families, health systems, and communities; outlines challenges to successful adoption of telemedicine; and provides concrete recommendations for ensuring that telemedicine reaches its full potential in meeting the health care needs of California’s most vulnerable children.

Telemedicine Helps Northern California Family

Kyle Gonyon, a 16-year-old who was born with a disorder of the central nervous system and cerebral palsy, requires multiple pediatric subspecialists to care for his health problems related to these diseases, including orthopedic and gastrointestinal problems and a severe seizure disorder. Kyle lives in Redding, California, where he sees his primary care and orthopedic doctors. However, his mother, Michelle, and Kyle have traveled as far as 320 miles in a day to see various pediatric subspecialists. Kyle's most frequent healthcare need is a neurologist to manage his seizure disorder. In the past, Michelle and Kyle have traveled a full day by car to see the neurologist. Now Kyle sees a neurologist 600 miles away at Cedars-Sinai Medical Center in Los Angeles through telemedicine based at Shasta Community Health Center in Redding—a ten minute drive from Michelle and Kyle's home. While Michelle and Kyle still need to travel long distances a few times a year to see other specialists, telemedicine has cut their travel time by more than half.

"Telemedicine has been a life saver. Kyle is getting the health care he needs without us having to travel two to three hours one-way, sometimes, to be told that nothing has changed."

—Michelle James, mother of Kyle

What Is Telemedicine?

Telemedicine is the use of ICT to provide health care services at a distance. A closely associated term is telehealth, which encompasses a broader definition of remote healthcare that includes nonclinical services, such as patient education, disease self-management, and medical training for providers.¹ Telemedicine and telehealth utilize ICT to provide a wide array of health services to individuals without requiring the individual to interact face-to-face with the health care provider delivering the care. Common applications of telemedicine and telehealth include videoconferencing between a patient and health care provider for a consultation or among groups of patients or providers for education, support, and 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.

An example of a typical application of telemedicine involves a patient at a health care facility in a rural or medically underserved area, where the type of provider the patient needs is not available. Such a facility is commonly known as a spoke site.² The spoke site, using ICT, links to what is known as a hub site—where the consultative services are provided.^{3†} In a typical telemedicine encounter,

[†] While the terms hub and spoke originated from a model where a large urban medical center served as the hub and smaller health centers, such as rural hospitals and clinics, served as the spokes, these terms have evolved. For the purposes of this issue brief, spoke refers to the site where the

the primary care physician at the spoke manages the patient's care and uses telemedicine to link to a specialist at the hub as needed for the patient's particular condition(s).

Telemedicine interactions often occur between two health care sites, such as a clinic and a hospital. However, the technology involved in telemedicine allows providers and patients to be almost anywhere, such as a child's home, a school, a child care center, or a juvenile detention center. Physicians can even attend to emergencies from their homes, using ICT, instead of or before going to the hospital to care for a patient.⁴

Telemedicine can occur in "real time," where the patient at the spoke and the provider at the hub interact simultaneously.⁵ Videoconferencing is the most common real-time telemedicine interaction. Telemedicine also occurs in the format of "store-and-forward." A store-and-forward interaction involves the transfer of data, such as an x-ray or a digital image, from the spoke to the hub for review and consultation at a later time.⁶

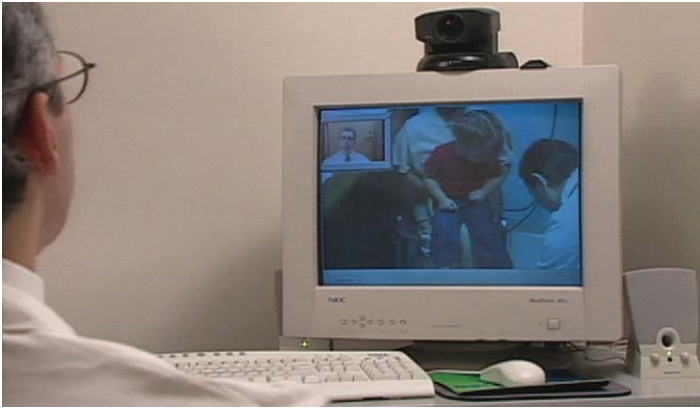
What Technologies Are Used in Telemedicine?

While telemedicine relies on a number of technologies, telecommunications technology is necessary to enable communication between two or more sites. Although Plain Old Telephone Service (POTS) and Integrated Service Digital Network (ISDN) are sufficient for many telemedicine interactions,[‡] they are limited in their ability to support more complex telemedicine applications, such as videoconferencing between more than two sites and transferring medical images at the level of quality needed for accurate diagnoses. Such applications rely on a high-speed Internet connection, or broadband. Broadband refers to a high-speed, always-on connection to the Internet, which enables information to be transferred with very little delay in receiving or sending.⁷ For optimal telemedicine performance, the broadband connection must be of sufficient bandwidth to enable all connection points to send and receive large amounts and complex sets of data quickly and accurately. Security measures must also be in place to ensure that data are transferred only to the intended recipients, protecting patients' privacy.

Telemedicine also uses 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. Telemedicine is utilizes wireless devices, such as cell phones and Personal Digital Assistants, to exchange data.

patient is located and hub refers to the site where the provider with whom the patient is connecting is located. Hubs can serve as spokes and spokes can be hubs, as needed.

[‡] ISDN is a system of digital phone connections, which can transmit voice, data, and video simultaneously over a connection.



Blue Cross of California Telemedicine Program

Why Does Telemedicine Matter for Children?

Low-income children living in medically underserved areas, including rural and parts of urban areas, face geographic and economic barriers to accessing health care. Telemedicine is a tool to help them obtain care they would otherwise face great difficulty accessing.

Health care provider shortages are a major factor impacting access to care. Twenty percent of California's population and 35 percent of those living below the Federal Poverty Level (FPL) live in federally designated shortage areas for health care.^{8,9} There is a particular shortage of pediatric subspecialists across the state and the nation.⁹ California has fewer pediatric subspecialists per child than the majority of other states, and it also has fewer than the national rate.¹⁰

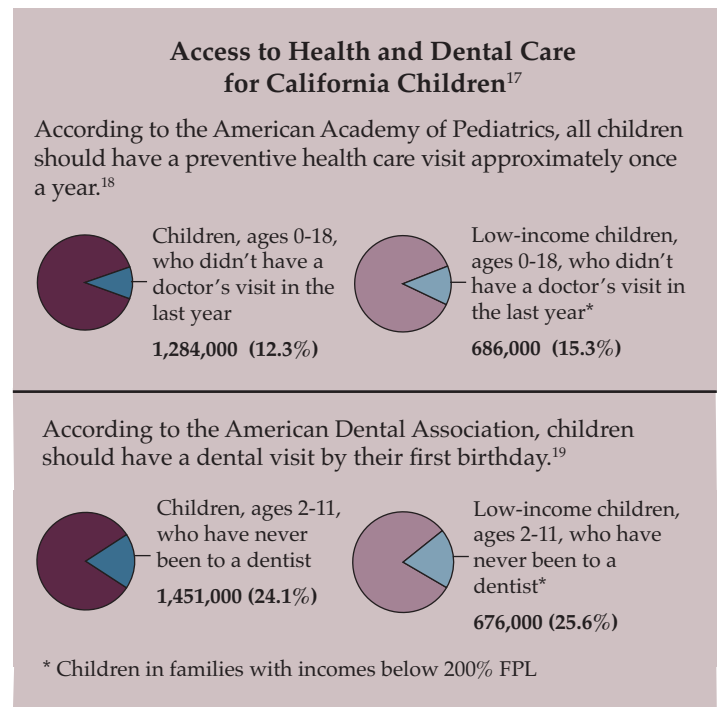
Provider shortages are markedly more prevalent in rural areas.¹¹ Therefore, while the shortage of pediatric subspecialists affects children in both urban and rural areas, children in rural areas have even less access to these providers. Even general pediatricians can be hard to find in rural areas. For example, between 1981 and 1996, there was a 73 percent increase of pediatricians, but the percentage of pediatricians practicing in rural areas remained low, with only 8.1 percent of general pediatricians located in rural counties, where 20 percent of the U.S. child population lived.¹²

Provider shortages are compounded for children enrolled in Medicaid due to low Medicaid reimbursement rates. In California, Medi-Cal pays physicians 59 percent of Medicare rates for the same service, below the national average of 69 percent.¹³ Medicaid is the largest source of health insurance for low-income children, and children in rural areas are enrolled in Medicaid at a higher rate than those in urban areas.¹⁴ As a result, low-income children living in rural areas face greater challenges in obtaining pediatric care.

§ The Federal Poverty Level in 2007 is \$17,170 annually for a family of three.

The location of where providers practice, even if there is sufficient supply, also affects access to care, especially for patients living in rural areas. The majority of pediatric subspecialists practice within academic medical systems and regional pediatric tertiary centers, which are usually not in remote areas, with only about 4 percent based in rural areas.¹⁵ While it may make sense for these providers to be located at pediatric tertiary centers for reasons related to demand and quality, it means patients in rural areas must travel greater distances to see subspecialists.

As a result of these shortages and the regionalization of pediatric subspecialists around pediatric tertiary centers, families may need to travel long distances for care and miss hours, or even days, of school and work. For example, a study conducted by UC Davis of parents with children with special health care needs found that 83 percent of parents said the drive to the specialist took more than one hour, and 40 percent missed work for their children's appointments.¹⁶



Extensive travel to access health care can be particularly burdensome for low-income families. Aside from the inconvenience, many low-income families do not have affordable transportation options, although Medicaid pays for some transportation.²⁰ Nationally, 956,584 children received delayed health care due to lack of transportation in 2002.²¹ In addition, low-income workers are more likely to lose pay when they miss work. For example, a survey conducted by the Henry J. Kaiser Family Foundation found that two-thirds of low-income women (family incomes below 200 percent of FPL) and three-quarters of very poor women (incomes below 100 percent of FPL) do not get paid when they miss work to care for a sick child.²²

History of Telemedicine

The use of ICT in the field of health is not new. For example, telemedicine, using videoconferencing, began in the 1950s. However, the use of telemedicine grew rapidly in the 1990s due to the increased availability of low-cost, high-quality computers and high-speed Internet, as well as the development of new technology tools to support high-quality and efficiently delivered health care.²³

CALIFORNIA

Legislation: The Telemedicine Development Act (TDA) of 1996 was one of the first and most comprehensive telemedicine laws in the country and has been used as a model for other states' telemedicine laws. This legislation prevents private and public health insurers from requiring face-to-face contact between providers and patients and requires insurers to adopt reimbursement policies for telemedicine services.²⁴

Medi-Cal: In compliance with the TDA, California was among the first states to adopt telemedicine reimbursement policies in its Medicaid program (Medi-Cal).^{*} Compared to other states, Medi-Cal has a relatively comprehensive telemedicine policy, such as reimbursing both the hub and spoke and reimbursing for some store-and-forward services.²⁵ In 2005, California enacted legislation to expand the Medi-Cal telemedicine reimbursement policy to include teledermatology and teleophthalmology via store-and-forward.²⁶ Legislation is currently being considered to include optometry in the definition of health care practitioners for the purpose telemedicine so that optometrists can be reimbursed for providing care via telemedicine.²⁷

Healthy Families:[†] The Healthy Families Program has advanced telemedicine in the state through the Rural Health Demonstration Projects (RHDP), legislatively authorized projects designed to fund rural collaborative health care networks to alleviate unique problems of access to health care in rural areas.²⁸ Since 1999, the Healthy Families Program has awarded RHDP funding to Blue Cross of California for a series of telemedicine projects. Blue Cross of California has used this funding to develop and manage a statewide telemedicine network. In addition, Blue Cross of California provides enhanced reimbursement for telemedicine services. The telemedicine network currently supports 65 telemedicine sites in 28 California counties and was used in nearly 2,000 patient encounters in 2006, including, but not limited to, Healthy Families enrollee encounters. Psychiatry and dermatology have accounted for the majority of specialty encounters over the network since 1999.²⁹

CTEC: With funding from California's major health foundations, the California Telemedicine and eHealth Center (CTEC) has been facilitating and supporting telemedicine programs throughout the state by providing funding, training, and education since 1997. CTEC currently supports ten telemedicine networks linking to more than 100 remote health care sites.³⁰ CTEC also supports the Telemedicine Learning Center at the University of California (UC) Davis, which has provided telemedicine training to more than 1,000 health care providers, and recently funded UC San Diego to develop a Southern California Telemedicine Learning Center.³¹

NATIONAL

Government: Though the military, Veteran's Administration, and other federal entities have been using telemedicine for years, the Office for the Advancement of Telehealth, now under the Health Resources and Services Administration, was established in the early 1990s to offer telehealth grants, provide technical assistance, and evaluate telehealth applications.³² Because telemedicine is affected by many sectors of government, numerous governmental bodies are engaged in funding and policy development related to telemedicine. Major federal sources of funding for telemedicine services include the United States Department of Agriculture Rural Utility Services and the Federal Communications Commission. Other governmental bodies engaged in telemedicine deployment include, but are not limited to, the Departments of Commerce, Education, Defense, Health and Human Services, and Veterans Affairs.³³

Providers and Advocates: Professional associations formed to promote telemedicine deployment, such as the American Telemedicine Association in 1993 and the Association of Telemedicine (now Telehealth) Service Providers in 1996.³⁴

Other States: As of 2005, 34 states provide some level of Medicaid reimbursement for health services provided through telemedicine. Five states, including California, require private payer reimbursement for telemedicine.³⁵

** Medi-Cal, California's Medicaid program, provides health and long-term care coverage to low-income children, their parents, and elderly and disabled Californians.*

† Healthy Families is a federal/state partnership to provide health, dental, and vision coverage to children in California who do not have health insurance and do not qualify for free Medi-Cal.

Children and Youth with Special Health Care Needs (CYSHCN)³⁶

	CA	U.S.
CYSHCN with 1 or more unmet needs for specific health care services	23.1%	17.7%
CYSHCN needing specialty care who had problems getting a referral	27.3%	21.9%
CYSHCN without a usual source of care (or who rely on the emergency room)	9.5%	9.3%

Provider shortages also present substantial barriers to care for children with special health care needs,[¶] who often require care from a multidisciplinary team of providers, including pediatric subspecialists. Nationally, 12.8 percent and, in California, 10.3 percent of children had a special health care need in 2001. While the rate of children with special health care needs was lower in California, these children had less access to care than children nationally.³⁷

The result is that, with limited alternatives, low-income parents in rural areas are more likely to rely on emergency department services to care for their child, see a primary care doctor who may not have the skills or expertise to treat the complex conditions their child presents, or delay or go without care altogether.³⁸

Telemedicine can help overcome these barriers by allowing patients to receive care in their local community and providers to deliver care at their usual places of practice.

How Can Telemedicine Improve Care for Children and Families?

Telemedicine can improve the health of children living in rural and medically underserved communities by providing access to quality health care and facilitating coordinated care for complex conditions. Telemedicine is used to screen, diagnose, treat, and monitor a wide range of pediatric health conditions from common childhood illnesses, such as strep throat and asthma, to conditions requiring specialty care in such fields as dermatology, endocrinology, emergency and critical care, neurology, gastroenterology, obesity, radiology, pathology, oral health, and psychiatry.³⁹ Telemedicine and telehealth applications help providers and patients manage the patient's health, reducing the need for more complex and costly hospital visits and health treatments later. Telemedicine can also create health care efficiencies through its ability to screen and triage patients, helping to assure patients see an appropriate provider when needed and avoid unnecessary visits when not needed. In addition, telemedicine and

[¶] As defined by the federal Maternal and Child Health Bureau, children with special health care needs are "children who have or are at risk for chronic physical, developmental, behavioral or emotional conditions and who also require health and related services of a type or amount beyond that required by children generally."

telehealth technologies can be used to improve health care quality by facilitating medical education, particularly for rural providers.

Emergency and Critical Care: Telemedicine is increasingly becoming a tool to treat children in hospitals, especially critically ill children. Many hospitals in rural and remote areas do not have the volume of pediatric patients or resources to support pediatric emergency and critical care services. Telemedicine can be used to meet the pediatric care needs of these hospitals.⁴⁰ For example, UC Davis Children's Hospital in Sacramento, California has used telemedicine to facilitate the availability of emergency and critical care consultations to a rural hospital in Northern California 24 hours a day, 7 days a week by installing telemedicine equipment at UC Davis' pediatric intensive care unit and in the homes of its pediatric critical care physicians. In addition to improving care quality, this application of telemedicine enables children to be screened and triaged so that they can stay in their local community when appropriate, avoiding high transportation costs and separation from families.⁴¹ Consulting with pediatric critical care physicians via telemedicine can also help the referring hospital to stabilize a child before and during transfer to a pediatric emergency services department.⁴²

"Through telemedicine, children at our clinic are receiving regular care for chronic conditions, such as seizure disorders and behavioral health problems, from pediatricians who live hundreds of miles away. Telemedicine also helps our clinics make the delivery of health care more efficient, reducing travel and related costs for both parents and providers, by enabling our ten different clinic sites to link to each other and share each others' health providers."

—Becky Coke, LVN, Telemedicine Coordinator, Open Door Community Health Centers, Crescent City, CA

Oral Health: Telemedicine can also be used to help children with needed dental screenings, treatment, and referrals. In California, a pediatric teledentistry program was launched in three school districts in 2006 to meet the dental health care needs of underserved children in Tulare County. Dentists from Childrens Hospital Los Angeles/University of Southern California (USC) School of Dentistry supervise an on-site hygienist, provide remote oral examinations and patient education, and develop a treatment plan for the child.⁴³ An evaluation of a teledentistry program in Rochester, New York that connects six inner-city elementary schools and seven child care centers to the Eastman Department of Dentistry at the University of Rochester found that the children who participated in the project most likely would never have received a dental screening at an early age, nor would their parents have received feedback on the need for dental care, were it not for the program.⁴⁴ A study of the program found that nearly 40 percent of 162 toddlers suffered from tooth decay. Early detection of such decay can prevent the child from painful



UC Davis Health System

and costly problems, visits to the emergency room, and extractions of teeth.⁴⁵

Vision Screening: Telemedicine is also used to screen children for early detection and treatment of vision problems, which have been known to affect academic performance.⁴⁶ A program of the University of Tennessee equips a mobile van with vision screening equipment to provide real-time vision screenings to children in parts of Tennessee and Mississippi. Examinees with vision problems are referred to eye professionals, and the exams that are ambiguous are sent via store-and-forward for a detailed reading, diagnosis, and referral, as necessary.⁴⁷

Mental Health: Mental health care is particularly suitable to telemedicine because of the ease of videoconferencing. Shasta Community Health Center in Redding, California has been using telemedicine to meet the mental health care needs of its patients for the past seven years because there are no child psychiatrists within hundreds of miles of the center. Through videoconferencing, they connect children to child psychiatrists at Cedars-Sinai Medical Center in Los Angeles and Kings View Corporation Behavioral Health Clinic in Fresno. In 2006, they facilitated approximately 345 telepsychiatry visits, which included child psychiatry.⁴⁸

Telepharmacy: Many small hospitals and clinics in rural and medically underserved areas cannot sustain 24-hour pharmacists. Using ICT, these facilities can be staffed with a nurse, or other more available and less costly health professional, and connect to pharmacies that are staffed 24-hours with pharmacists. For example, UC Davis Health System piloted a telepharmacy program, linking six rural hospitals to the UC Davis Health System in Sacramento. While these hospitals all had on-site pharmacies, they did not have the resources or capacity to staff a pharmacist after regular business hours. To meet the needs of these hospitals after hours, hospital staff faxed their medication orders to UC Davis Health System's pharmacy for a pharmacist to review and verify. A nurse at the remote site then pulled the medications from the pharmacy shelves and contacted

the UC Davis Pharmacy via a videoconferencing system, which enabled the UC Davis pharmacist to see medication labels and verify the medication and strength. This endeavor was a one-year pilot, but met such a great need that UC Davis has developed a system where the hospitals can continue to purchase pharmacy services through the Remote Telepharmacy Program.⁴⁹

Children with Special Health Care Needs: Children with special health care needs, such as autism, genetic diseases, mental retardation, depression, anxiety, and behavioral problems, often require multiple and coordinated health and related services on an ongoing basis from a multidisciplinary set of providers.⁵⁰ Telemedicine can be especially valuable for children with special health care needs who live in rural or medically underserved areas because of the lack of pediatric subspecialists in these areas.⁵¹ Kern Regional Center uses telemedicine to connect children with developmental disabilities in Kern, Inyo and Mono Counties—very remote areas in California—to pediatric psychiatrists, neurologists, and other subspecialists at major medical centers throughout the state. Through approximately 2,000 telemedicine consults a year, Kern Regional Center has helped children get the care they need while reducing their absences from school and their parents' absences from work. Kern Regional Center has also used telemedicine to coordinate children's care by simultaneously connecting the members of a child's care management team, such as the pediatrician, teacher, subspecialist, and the regional center staff.⁵²

Home Health Care: Telehealth technology has helped improve the lives of families of chronically ill children by allowing them to keep their children at home. Remote monitoring devices can alert parents and providers when a health indicator, such as heart rate, shows a significant change. Videoconferencing can allow providers to see their patients without the patients having to travel. This is especially beneficial for chronically ill children who may need multiple interactions with their providers.⁵³

Child Abuse Evaluations: Telemedicine applications are being used to protect children by conducting child abuse consultations and examinations at a distance. A program in rural Florida uses specialized cameras and teleconferencing to allow medical staff at remote locations to conduct live child abuse assessments with child abuse experts at a hub site. Input from child abuse experts is oftentimes critical to ensure sensitivity, thoroughly conducted exams, and proper documentation of evidence. A similar project exists in California through the UC Davis Pediatric Telemedicine Program.⁵⁴

Educating Families: Many parents do not have access to all the information they need to care for their children, especially when they live far from providers. Telemedicine can bring interactive learning tools to parents in their home communities. A program in California, run by the

USC University Center for Excellence in Developmental Disabilities and the Northern Sierra Rural Health Network (NSRHN), linked approximately 100 Spanish-speaking families of children with epilepsy in 15 different remote community sites, such as clinics and county offices of education, to a Spanish speaking pediatric epileptologist using videoconferencing, allowing families to learn about their children's medical condition. The training is posted on various Web sites for families to access at a later date.⁵⁵

Supporting Families: Another important way ICT supports families is by helping families stay connected when a child must be hospitalized. Baby CareLink, operating in several states, is a multifaceted telemedicine program developed to enhance interactions between families, staff, and community providers and improve the health of low-birth-weight babies. Videoconferencing allows virtual visits and distance learning from a family's home during an infant's hospitalization. Once the infant comes home, technology is used to make virtual house calls and conduct remote monitoring. Through these technologies, parents gain the knowledge, skills, and support they need to take care of their babies at home. Studies have shown that the program has led to shorter hospital stays for these babies, resulting in improved outcomes for families and reduced costs associated with hospital stays.⁵⁶

Disease Management: Information and Communications Technology tools can help parents and children manage chronic health conditions. There are numerous online education and management tools for chronic conditions, such as childhood diabetes and asthma. There are also interactive programs for youth and parents to use with their providers. A program run by the San Mateo Medical Center in San Mateo County, California helps children manage their asthma through the use of cell phones. Currently 50 children, ages 5 to 18 with moderate to severe persistent asthma, are participating in a program in which they are given cell phones loaded with special software that allows them to report information on their asthma symptoms, medications, and daily activities. The information is transmitted through a Web portal to asthma case managers who, in turn, respond back with advice on next steps, including a return phone call for coaching when children demonstrate risk. The information is also uploaded into a patient registry, which helps health staff see changes in the patients' conditions over time and make adjustments to their treatment plan. Over a one-year period, these children experienced no emergency room visits or hospital stays due to asthma and they rarely came into the clinic for asthma-related medical treatment. This can be compared to an expected rate of one to two emergency room visits or hospital stays related to asthma for similar children with persistent asthma.⁵⁷

Language Translation: With nearly 40 percent of Californians' primary language being one other than English, ICT has greatly facilitated language translation

at hospitals and clinics.⁵⁸ Videoconferencing equipment allows health providers to bring translators to the exam room in a short amount of time without needing the translator to be physically present. For example, the Health Care Interpreter Network, operated by Northern California public hospitals, allows hospitals to share translation services. A centralized call center routes requests for interpreter services among participating hospitals using a secure high-speed data line dedicated to video and voice interpretation services.⁵⁹

Supporting Rural Providers and Providing Medical Education: Rural health care providers often have limited opportunities to interact with other providers and to participate in conferences and training without extensive travel.⁶⁰ Videoconferencing is a simple way to keep rural providers connected and to help them fulfill continuing medical education requirements. For example, NSRHN has used its telehealth network to coordinate more than 2,400 medical education events trainings over a seven-year period for providers (including physicians, physician assistants, social workers, and nurses) who live and work in rural and remote areas of California. NSRHN has linked providers from multiple local community sites to medical experts from around the country to provide training on a range of health topics, allowing these child health providers to obtain the expertise and continuing education credits they need to best serve the patients in their care—training they may have gone without due to travel, resource, and time constraints.⁶¹

Caring for Children Where They Are Located: Educators and child development experts know that you cannot teach to an empty desk, nor can you teach children who do not feel well or cannot see the blackboard. Telemedicine complements and expands the capacity of schools and child care centers to address the health care needs of children. For example, the TeleKidcare program, a partnership between the Kansas University Medical Center and several schools throughout the state of Kansas, allows children and school nurses to interact with pediatricians



UC Davis Health System

via videoconferencing. School nurses are also equipped with digital otoscopes and electronic stethoscopes. Together, the technology allows the physicians to diagnose and treat, from a distance, a wide range of ailments. Forty-seven percent of consults have been for ear, nose, and throat concerns; 31 percent for behavioral health issues; 10 percent for eye-related complaints; 9 percent for respiratory ailments; and 3 percent for other diseases.⁶² Eighty-five percent of health consults occurred on the day that they were requested, allowing providers to catch and treat problems early.⁶³

Telemedicine can complement and expand the capacity of schools and child care centers to address the health care needs of children.

A program of the University of Rochester Medical Center in Rochester, New York links children in inner-city child care centers to pediatricians using videoconferencing, specialized cameras, and electronic stethoscopes.⁶⁴ After evaluating the child via telemedicine, the pediatricians make a diagnosis, prescribe treatments, and provide a treatment report to the child's pediatrician when applicable.⁶⁵ A survey of parents who participated in the program found that nearly 94 percent of problems managed by telemedicine would otherwise have led to a doctor's office or emergency department visit.⁶⁶ The program led to a 63 percent reduction in absences from child care. Finally, more than 91 percent of the parents of the children in the program stated that telemedicine allowed them to stay at work.⁶⁷

Telemedicine applications at schools can also be very effective in helping children manage common chronic health conditions, such as asthma, diabetes, and obesity. The Asthma Telemedicine Program, a two-year pilot project, connected 96 students in three San Francisco elementary schools with asthma experts at San Francisco General Hospital via videoconferencing. The experts assessed the student's health, developed a disease management plan, and reviewed the student's use of the peak flow meter and the medication inhaler.⁶⁸ The program demonstrated significant improvements in children's and families' quality of life as it related to the child's asthma and increased asthma knowledge for both children and their parents.⁶⁹

When Is Telemedicine Appropriate?

While telemedicine has helped many children access needed and high-quality health care, it is not always an appropriate substitute for in-person care. A face-to-face

visit may be clinically necessary, for example, to perform a tactile exam or procedure or to more closely monitor a patient.⁷⁰ At times, telemedicine consults may identify a need for follow-up care that cannot be appropriately provided through telemedicine. Telemedicine programs should be prepared to arrange for referrals in such situations. In addition, when high-quality services are available in person, telemedicine may not be a cost-effective option. Children and families may also prefer to receive services in person, even if they have to travel extensively to receive care.

Yet, telemedicine serves to complement in-person care and can fill a gap when needed care is not otherwise available. Payers often limit telemedicine reimbursement to such circumstances. For example, Medi-Cal imposes restrictions on the use of telemedicine by providing reimbursement only when a barrier to face-to-face care exists. Medi-Cal providers billing for telemedicine services, using the telemedicine billing code, must indicate that a barrier exists to a face-to-face visit. Providers are also asked to identify what that barrier is, such as a lack of a local provider, unacceptable wait time for a local provider, lack of a local provider willing to accept Medi-Cal, lack of a local provider able to address the patient's language or cultural needs, lack of available transportation, or the necessary time off from work to see a provider face-to-face would create a financial or personal hardship.⁷¹

What Are Some Essential Elements of Successful Telemedicine Programs?

In order for clinics, hospitals, or other sites, such as schools and child care centers, to have successful telemedicine programs, several things need to be in place. Without these components, providers may invest in the necessary technology and equipment, only to find that it goes unused. Essential elements of a successful telemedicine program include the following.

The Telemedicine Champion: First and foremost, telemedicine programs need a champion. This is a person in the provider organization who is committed to building and sustaining the telemedicine program over the long term, incorporating it into the organization's business plan. This person must recognize and articulate the need for and benefit of incorporating telemedicine into the organization's infrastructure. Ideally, this person is someone who has authority to make decisions regarding organizational policies.

The Telemedicine Coordinator: A successful telemedicine program staffs a telemedicine coordinator. The role of the coordinator is to identify providers with whom to connect; schedule telemedicine visits and arrange referrals for any necessary follow-up care; ensure that relevant information about the patient, such as the history, lab work

and test results, is sent to the hub or consulting doctor; and manage the technology and equipment, making sure the site has what it needs and that the equipment works. The coordinator needs to be well-supported with access to training in areas such as technology and paperwork requirements. He or she also needs access to technical assistance and enough time to do his or her job well.⁷² While most coordinators are staffed at the spoke site, hub sites also need staff to ensure telemedicine visits are successful.

Incorporating Telemedicine into Day-to-Day Activities: Telemedicine must be easy for patients and providers to use. By incorporating telemedicine into daily operations, it becomes second nature to patients and providers and is not seen as an additional burden. For example, the Telehealth and Visiting Specialist Center of Open Door Community Health Centers in Northern California equipped each of its exam rooms for telemedicine encounters so that specialists can see patients in person or via telemedicine using the same exam rooms, rather than requiring them to go to another room or building to conduct a telemedicine visit.⁷³

Technology and Support: For telemedicine interactions to be successful, the appropriate equipment and technology must be available. Clearly, telemedicine programs must have reliable equipment, such as videoconferencing equipment, cameras, and electronic medical devices. In addition, the telecommunications technology used must be able to reliably and securely transmit data at the speed and quality necessary for the interaction to be clinically accurate. Furthermore, providers and staff at both the spoke and hub must be trained in the appropriate use of the technology. Finally, technical support must be available to maintain the equipment and provide assistance when necessary.

What Are the Costs and Benefits of Telemedicine?

As the field of telemedicine has grown, researchers have started to evaluate the value of telemedicine to health care systems and local economies, the quality of health care it facilitates, and patient and provider satisfaction. Much of what we know is based on small isolated studies. Longitudinal research on the long-term impact of telemedicine is needed. However, initial findings indicate that telemedicine has great potential to improve health care access and quality, create health care system efficiencies, and benefit local communities when it is implemented and applied appropriately.

Health System Costs: While the initial and ongoing investment required for telemedicine can be costly due to equipment, connectivity, and support needs, telemedicine has the potential to be on par with the costs of an in-person



visit.⁷⁴ This result, however, depends on volume: the higher the number of telemedicine visits at one site, the lower the costs per visit. For example, a cost analysis of the TeleKidcare program in Kansas found that when over 200 telemedicine consults were completed over a one-year period across ten school sites, the average cost per consult dropped to under \$150, making them competitive with traditional office-based consults.⁷⁵ Furthermore, as the cost of technology continues to decrease and more patients use this tool to access care, it is expected that telemedicine will become even more economical.

In addition, there is evidence that telemedicine can reduce overall costs to health and related systems due to better management of chronic diseases, fewer hospital visits, and health system transportation savings. A home telehealth disease management program in North Carolina saved \$125,000 in four months by decreasing hospitalizations and emergency department visits.⁷⁶ While definitive results are not yet available, the San Mateo cell phone project described above provides evidence of how technology can help with disease management and reduce costly emergency room and hospital stays for children. Furthermore, a telehome health care pilot project in California helped nurses avoid traveling 145 hours and 7,500 miles for 106 visits over a three-year period.⁷⁷ In Tennessee, more than 62,000 miles of travel were avoided by using telehealth in over 1,000 home visits, saving \$50.29 per home visit in mileage and nurse travel time.⁷⁸ Finally, California could save a significant share of the nearly \$140 million it spends annually for medical transportation in its Medi-Cal program by relying on telemedicine to care for patients, as appropriate, rather than paying for transportation for these patients.⁷⁹

Local Economies: Lack of health services in a community can result in loss of revenue to locally available ancillary health services and other local businesses within the resident's home community, which can undermine the local economy. Telemedicine addresses this concern by allowing most services, except for the consult from a

distant provider, to be provided within the community. For example, most rural hospitals and clinics have the ability to perform lab, x-ray, and other medical exams. Because telemedicine keeps the practice of health care local, there is a demand for these ancillary health services, which in turn creates jobs and other investments in the community.⁸⁰ Over a two-year period, an inpatient telemedicine program in California generated \$388,000 for the local intensive care unit by keeping children in the local community hospital rather than transporting them.⁸¹ A telepharmacy project in North Dakota reported contributing approximately \$12 million to the local rural economy—including adding 40 to 50 new jobs—by using videoconferencing to allow pharmacists to supervise remote technicians in dispensing medication.⁸²

Patient Satisfaction: Surveys of parents and patients consistently demonstrate very high satisfaction with the telemedicine experience. Parents and patients believe the quality of care they receive is as good as in-person interactions with the health care provider and they feel their needs are being met. In addition, parent surveys have shown that parents appreciate not having to travel for long periods for an appointment, saving them time and allowing them to miss little or no work.⁸³ Surveys from the Blue Cross of California Telemedicine Program of more than 1,200 patients over a six-year period showed approximately 90 percent of patients reporting high satisfaction after using telemedicine.⁸⁴ Ninety-eight percent of parents of children who participate in the TeleKidcare program in Kansas report being “satisfied” or “very satisfied” with their child’s care. However, patients do express some concerns with telemedicine, such as ensuring privacy and not having the personal face-to-face interaction with the provider.⁸⁵ Though telemedicine can provide the quality of care achieved in an in-person visit, ultimately, the patient and parent need to feel comfortable with the interaction for it to be a success.

Telemedicine can reduce overall costs to health and related systems due to better management of chronic diseases, fewer hospital visits, and transportation savings.

Provider Satisfaction: Surveys of telemedicine providers also reflect high satisfaction. Providers report that they appreciate being able to examine test results on their own timetable (for example, via store-and-forward), and enjoy the educational opportunities telemedicine provides.⁸⁶ According to provider surveys from the Blue Cross of California Telemedicine Program, telemedicine provided the information, advice, or expertise primary



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care providers needed to care for their patients and supported specialists to meet diagnostic and treatment needs.⁸⁷ However, some providers express concerns about potential burdens, such as added work, costs, and training. The amount of time initially required to set up and adapt to telemedicine technology can be a barrier to gaining full support from healthcare providers. Furthermore, providers express concerns about the competency of the provider on the other end.⁸⁸

What Are the Challenges to Successful Adoption of Telemedicine?

In addition to the challenges of providing the essential elements of telemedicine programs discussed earlier, there are a number of policy barriers and ambiguities preventing optimal deployment and utilization of telemedicine in California.

Reimbursement for Telemedicine Services: There is not always a strong business case for providers to participate in telemedicine, primarily due to reimbursement issues. For example, both spoke and hub telemedicine providers incur multiple costs that are not fully reimbursed by Medi-Cal and other insurers, such as those related to equipment acquirement and maintenance, staffing, training, and telecommunications. In addition, some spoke sites enter into a financial contract directly with a specialist in order to ensure access to him or her. Oftentimes, they cannot seek reimbursement from a payer for these contracts. Payers’ telemedicine reimbursement policies may also be unclear or poorly administered and may not recognize the various costs associated with a telemedicine visit. As a result of such financial challenges, many telemedicine programs are only sustainable with grant funding, which is often narrowly tailored and time limited. For example, despite

promising initial results, the Asthma Telemedicine Project mentioned above was not sustainable after grant funding ended due to a lack of insurance reimbursement for the telemedicine visits and school nursing shortages to help the children through the program.⁸⁹

Provider Shortages: While there is a shortage of pediatric subspecialists throughout California and the nation, there are even fewer who participate in telemedicine, leaving telemedicine coordinators scrambling to find providers with whom to link their patients.

Telecommunications Infrastructure: Many communities across the state do not have affordable access to a broadband connection of sufficient bandwidth to conduct certain telemedicine interactions successfully. This gap disproportionately affects low-income and underserved communities whose residents are in the greatest need of medical care and who, therefore, could benefit most from telemedicine.

Regulatory Environment: Legal barriers may discourage providers from using telemedicine to treat all children in need. For example, it can be challenging for telemedicine providers to obtain the licensing, credentialing, and liability protections they need to be able to treat a patient at a remote site, particularly if the patient is in another state. Providers may also have concerns about complying with state and federal anti-trust, anti-kickback, and self-referral rules.

Research Needs: To date, there has been very little research of sufficient reliability and rigor to demonstrate the impacts of telemedicine at the organizational, health system, or population levels. Such research is needed to better understand telemedicine's benefits and where it should most suitably be deployed. Research is also needed to educate providers and payers about the value of telemedicine for their patients and their businesses.

Why Does Telemedicine Matter Now?

California leaders are actively pursuing efforts to harness ICT to transform health systems and improve Californians' health. Between July 2006 and March 2007, Governor Schwarzenegger signed three Executive Orders to create a California eHealth Action Forum and state policy agenda, to establish a California Broadband Task Force (which includes a health care working group), and to accelerate the adoption of Health Information Technology.⁹⁰ As a condition of California's approval of telecommunications mergers, the California Emerging Technology Fund was established and funded in late 2005 with the goal of accelerating the deployment of broadband, particularly to underserved communities and populations. In late 2006, voters passed Proposition 1D, which provides \$200 million to the University of California to expand telemedicine programs.

Each one of these efforts has the potential to promote the deployment of telemedicine to meet the unique health care needs of low-income and underserved children. They can also provide leverage for other promising E-Health applications beyond telemedicine. For example, properly designed telemedicine connections between clinics and major medical centers can also provide for the exchange of electronic health records.



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In addition, there has been particular attention paid in the last couple of years to increasing access to health care for children by decreasing the number of uninsured children and by increasing the number of and capacity of school-based health centers. As more children become insured (thus, removing a financial barrier to care), telemedicine can help ensure receipt of appropriate services by overcoming geographic and other economic barriers. Telemedicine can also help school-based health centers meet the health care needs of the children they serve.

A Policy Action Agenda to Extend Appropriate Use of Telemedicine for California's Children

Update Medi-Cal policies to adequately reimburse for telemedicine services. While California's reimbursement policy for telemedicine services is fairly generous compared to other states, Medi-Cal policy should be improved. Medi-Cal does not reimburse for ancillary, but essential, services related to the telemedicine visit, such as setting up the equipment, coordinating and scheduling the visit, and telecommunications. California should follow the example of other states and programs in reimbursing for the costs associated with providing ancillary services related to telemedicine. North Carolina and Washington State, for example, provide a facility fee of \$20 to the spoke site.⁹¹ Blue Cross of California provides a facility fee to both the hub and spoke site. It also reimburses for telecommunication charges for live video consultations and telephone charges associated with telemedicine interactions.⁹²



may vary in practice. Clarity around CCS reimbursement is especially relevant since CCS-enrolled children tend to have a greater need for pediatric subspecialists of which there is a greater shortage—a shortage that telemedicine can help address. This lack of clarity and consistency among payers presents a burden to telemedicine providers, a barrier to further adoption of telemedicine in the state, and a missed opportunity to improve care for children.

California should establish and enforce clear standards for telemedicine reimbursement by all payers in the state. These standards should encourage high-quality telemedicine services that improve patients’—including children’s—access to appropriate care. The standards should specify considerations for both in-network and out-of-network services, since telemedicine may involve a remote provider outside of a health plan’s network when no appropriate in-network provider is reasonably available.

Ensure access to affordable broadband access for rural and underserved communities. California is currently engaged in efforts to achieve ubiquitous broadband access across the state. These efforts should make the health needs of low-income and underserved children a priority.

Increase the number of pediatric subspecialists who participate in telemedicine. Some pediatric subspecialists may not participate in telemedicine because they perceive it to be inconvenient or they are busy enough with their in-person patient load. However, some simply may not know about it or how to participate.

Efforts should be made to educate and incentivize subspecialists to participate in telemedicine. For example, telemedicine should be incorporated into medical school curriculum, and, as this begins to happen, models should be shared throughout California and the nation.⁹⁴ Telemedicine champions should continue to reach out to providers through their professional associations and Continuing Medical Education opportunities.

Furthermore, states and the federal government should explore incentives that encourage specialists to participate in telemedicine. For example, the National Health Service Corp (NHSC) provides loan repayment programs to health providers who practice in underserved areas. Since health providers in urban areas provide health care to patients in underserved areas via telemedicine, a program like the NHSC could provide a financial incentive to these providers for time they spend caring for patients in underserved areas, whereas now the program requires participants to be physically located in the underserved area and provide full-time services.⁹⁵

In addition, stakeholders should continue to explore models for better deployment of pediatric subspecialists who do participate in telemedicine.⁹⁶ For example, many spoke sites have relationships with one particular specialist

Furthermore, California should regularly assess and update Medi-Cal reimbursement policies as new clinically appropriate telemedicine applications are developed. For example, California currently limits reimbursement for store-and-forward applications to teledermatology and teleophthalmology. However, store-and-forward in other health specialties, such as oral health, cardiology, and pathology, may be clinically appropriate, and reimbursement for their applications should be considered. Other states’ Medicaid programs, such as those of Arizona and Georgia, and other payers, such as Blue Cross of California, do not restrict Medicaid reimbursement to particular store-and-forward applications.⁹³ Such policies should be adopted by Medi-cal and other public and private payers.

Clarify and standardize current reimbursement laws for telemedicine. California’s Telemedicine Development Act of 1996 prevents private insurers and the Medi-Cal program from requiring face-to-face contact between provider and patient and requires them to adopt reimbursement policies for telemedicine services. However, payers have interpreted and implemented this requirement inconsistently. While Medi-Cal fee-for-service pays for telemedicine services and Blue Cross of California pays for telemedicine services for its public program and commercial business enrollees, the telemedicine reimbursement policies for other Medi-Cal, Healthy Families, and private group and individual health plans are unclear. In addition, payers need to provide mechanisms, such as additional modifier codes, for noting all services delivered via telemedicine so that the provision of telemedicine services are not inhibited by the lack of the ability to bill. Furthermore, there is a lack of clarity as to which telemedicine services California Children’s Services (CCS) reimburses.^{**} Though CCS technically follows Medi-Cal telemedicine reimbursement policy, reimbursement

^{**} CCS is a statewide program that treats children with certain physical limitations and chronic health conditions or diseases.

making access to care difficult when that specialist is not available. However, another specialist may be available. Stakeholders should explore ways to pool their specialists so that there is a better distribution between supply and demand to optimize the state's already limited supply of specialists.

Invest in research. Far-reaching longitudinal research is needed to understand the most effective use of telemedicine in order to inform greater public and private investments and appropriate deployment of telemedicine as well as to provide standards for incorporating telemedicine into regular health care practice.

Explore solutions to legal and bureaucratic barriers to extending telemedicine while ensuring patient safety and high health care quality are maintained. One barrier, for example, concerns off-site credentialing for providers who want to practice medicine, beyond the provision of consultation services, via telemedicine at another hospital with which he or she is not already associated. To do this, he or she must be credentialed by that hospital. This credentialing process is expensive, burdensome, and lengthy. Finding ways to streamline it for providers, while maintaining quality assurance controls, would facilitate broader adoption of telemedicine. Cross-state licensure issues present similar challenges for providers seeking to treat patients in other states. California should work with its national partners to identify solutions for the practice of high-quality telemedicine across state lines.

Extend telemedicine to care for children where they are located. California should explore opportunities to extend telemedicine to California's schools, child care centers, and other sites where underserved children frequent. Telemedicine can serve as a tool to complement and expand the capacity of school health nurses, school-based health centers, child care centers, and other community-based sites by linking children with the preventive and regular health care they need on-site, while minimizing school and work absences. California stakeholders should continue to explore and develop replicable models to assist these child-focused communities in helping children get the health care they need through telemedicine.

Moving Forward

As Information and Communications Technology continues to advance and new opportunities for remote health care emerge, this era provides a tremendous opportunity to ensure that children, particularly low-income and underserved children, across California and the nation benefit from these developments. Through a focused policy agenda, we can remove geographic and economic barriers to high-quality health care for tens of thousands of children and families. By building on the success of California's telemedicine programs, while taking advantage of the momentum of Health Information

Technology, California can maximize appropriate and widespread use of telemedicine to improve the health of California's children.

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End Notes

- 1 About Telemedicine, American Telemedicine Association, 1 May 2007 (<http://www.atmeda.org/news/overview.htm>); California Telemedicine and eHealth Center, A Glossary of Telemedicine and eHealth (Sacramento, CA: California Telemedicine and eHealth Center, 2006) 25.
- 2 California Telemedicine and eHealth Center, A Glossary of Telemedicine and eHealth (Sacramento, CA: California Telemedicine and eHealth Center, 2006) 22.
- 3 Ibid. 13.
- 4 James P. Marcin, Associate Professor, UC Davis Children's Hospital, Conversation with author, 10 Jul. 2007.
- 5 op. cit. (2) 21.
- 6 op. cit. (2) 22.
- 7 Communications Workers of America, Speed Matters: Affordable High Speed Internet for All (Washington, D.C.: Communications Workers of America, 2006) 3 (<http://files.cwa-union.org/speedmatters/SpeedMattersCWAPositionPaper.pdf>).
- 8 Michael Byrne, Research Geographer, Office of Statewide Health Planning and Development, California Health and Human Services Agency, Conversation with author, 18 Jul. 2007.
- 9 A pediatric subspecialist is a pediatrician who has obtained sub-board certification in 1 of the 16 American Board of Pediatrics-designated subspecialties as defined in Ethan A. Jewett, et al., "The Pediatric Subspecialty Workforce: Public Policy and Forces for Change," *Pediatrics*, Vol. 116, No. 5 (2005): 1192-1202; Alan Gruskin, et al., "Final Report of the FOPE II Pediatric Subspecialists of the Future Workgroup," *Pediatrics*, Vol. 106, No. 5 (2000): 1224-1244.
- 10 Workforce Data Book, The American Board of Pediatrics, 20 May 2007 (<https://www.abp.org/ABPWebSite/>).
- 11 For example, in metropolitan counties containing a large city, there are nearly four times as many physicians per 100,000 residents as there are in rural counties with only small towns, as stated in William P. O'Hare and Kenneth M. Johnson, "Child Poverty in Rural America," *Reports on America* (Washington, D.C.: Population Reference Bureau, Vol. 4, No. 1, 2004) 8; Forty-five percent of rural Californians live in areas designated as Primary Care Health Professional Shortage Areas by the Federal Government, as stated in Janet Coffman, et al., *Improving Recruitment and Retention of Primary Care Practitioners in Rural California* (Berkeley, CA: California Program on Access to Care, 2002) 1.
- 12 Greg D. Randolph, et al., "Trends in the Rural-Urban Distribution of General Pediatricians," *Pediatrics*, Vol. 107, No. 2 (2001): e18 (<http://pediatrics.aappublications.org/cgi/reprint/107/2/e18.pdf>).
- 13 California HealthCare Foundation, *Medi-Cal Facts and Figure: A Look at California's Medicaid Program* (Oakland, CA: California HealthCare Foundation, 2007) 51.
- 14 The Kaiser Commission on Medicaid and the Uninsured, *Medicaid: A Primer* (Washington, D.C.: The Henry J. Kaiser Family Foundation, 2007) 6; Kaiser Commission on Medicaid and the Uninsured, *Health Insurance Coverage in Rural America* (Washington, D.C.: The Henry J. Kaiser Family Foundation, 2003).
- 15 op. cit. (9); Alan Gruskin, et al.; Jeffrey J. Stoddard, et al. "Providing Pediatric Subspecialty Care: A Workforce Analysis," *Pediatrics*, Vol. 106, No. 6 (2000): 1328; Erin Aaberg Givans, Conversation with author, 11 Jul. 2007.
- 16 James P. Marcin, et al., "Using Telemedicine to Provide Pediatric Subspecialty Care to Children With Special Health Care Needs in an Underserved Rural Community," *Pediatrics*, Vol. 113, No. 1(2004): 1-6.
- 17 Data from the 2005 California Health Interview Survey, University of California Los Angeles, Calculations by The Children's Partnership, 13 Jun. 2007 (<http://www.chis.ucla.edu>).
- 18 American Academy of Pediatrics Committee on Practice and Ambulatory Medicine, *Recommendations for Preventive Pediatric Health Care (RE9535)* (American Academy of Pediatrics: Elk Grove Village, IL, 2000) 13 Jun. 2007 (<http://practice.aap.org/content.aspx?aid=1599&nodeID=4008>).
- 19 American Dental Association, "Baby's First Teeth," *Journal of the American Dental Association*, Vol. 133 (2002): 255 (http://www.ada.org/prof/resources/pubs/jada/patient/patient_11.pdf).
- 20 Irwin Redlener, et al., *The Growing Health Care Access Crisis for American Children: One in Four at Risk* (New York, NY: The Children's Health Fund, 2007) 2-3, 7-8 (<http://www.childrenshealthfund.org/calendar/WhitePaper-May2007-FINAL.pdf>).
- 21 P. Hughes-Cromwick, et al., *Cost Benefit Analysis of Providing Non Emergency Medical Transportation* (Ann Arbor Michigan: Altarum Institute, 2005) 9.
- 22 Roberta Wyn, et al., *Women, Work, and Family Health: A Balancing Act* (Washington D.C.: The Henry J. Kaiser Family Foundation, 2003) 2.
- 23 *The History of Telemedicine*, California Telemedicine and eHealth Center, 3 May 2007 (http://www.cteconline.org/telemedicine_history.html); Fran Turisco and Jane Metzger, *Rural Health Care Delivery: Connecting Communities Through Technology* (Oakland, CA: California HealthCare Foundation, 2002) 8.
- 24 California Statutes, Chapter 864 (1996), *Telemedicine Development Act of 2006* (http://www.leginfo.ca.gov/pub/95-96/bill/sen/sb_1651-1700/sb_1665_bill_960925_chaptered.pdf).
- 25 Lise Youngblade, *Telemedicine for CSHCN: A State-by-State Comparison of Medicaid Reimbursement Policies and Title V Activities* (Florida: Institute for Child Health Policy, University of Florida, 2005) 6-22 (http://telehealthconnections.ichp.ufl.edu/documents/Telemedicine_in_Medicaid_and_Title_V_Report.pdf).
- 26 California Statutes, Chapter 449, 2005 (http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0351-0400/ab_354_bill_20050930_chaptered.pdf).
- 27 California AB 1224 (Hernandez), amended 10 April 2007, 5 July 2007 (http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1201-1250/ab_1224_cfa_20070416_100453_asm_comm.html).
- 28 California Insurance Code § 12693.91.
- 29 Alba Quiroz-Garcia, *Rural Health Demonstration Projects: Fact Book 2007* (Sacramento, CA: Managed Risk Medical Insurance Board, 2007) 6-7, 19-25.
- 30 California Telemedicine and eHealth Center, *California Telemedicine and eHealth Center: 2006 Annual Report* (Sacramento, CA: California Telemedicine and eHealth Center, 2007) 3.
- 31 Telemedicine Learning Center, UC Davis Health Center, 6 May 2007 (<http://www.ucdmc.ucdavis.edu/cht/programs/tlc/>); California Telemedicine and eHealth Center, CTEC Announce Award of \$1 Million Southern California Telemedicine Learning Center Grant, News Release, 1 May 2007.
- 32 Bridget Hogan Cole, Director, IT and Special Projects, Comprehensive Community Health Centers, Inc., Conversation with author, 12 July 2007; Telehealth, Office for the Advancement of Telehealth, 12 Jun. 2007 (<http://www.hrsa.gov/telehealth/default.htm>).
- 33 Joint Working Group on Telehealth, Office for the Advancement of Telehealth, 12 Jun. 2007 (<http://www.hrsa.gov/telehealth/jwgt.htm>).
- 34 ATA About the Association, American Telemedicine Association, 12 Jun. 2007 (<http://www.americantelemed.org/about/aboutH.htm>); Association Profile, The Association of Telehealth Service Providers, 12 Jun. 2007 (<http://www.atasp.org/about/profile.asp>).
- 35 Pamela Whitten and Lorraine Buis, "Private Payer Reimbursement for Telemedicine Services in the United States," *Journal of Telemedicine and e-Health*, Vol. 13, No. 1 (2007): 16.
- 36 Data Resource Center for Child and Adolescent Health, *The Child and Adolescent Health Measurement Initiative, National Survey of Children with Special Health Care Needs, 2001 California*, 13 Jun. 2007 (<http://cshcndata.org/Content/StatePrevalence.aspx?geo=California>). For purposes of national comparisons, 2001 data were used. In 2003, 8.3% of California children had a special health care need according to the 2003 California Health Interview Survey with calculations by The Children's Partnership (<http://chis.ucla.edu/main/DQ2/output.asp>). 2005-06 national and state data on children with special health care needs will be available in Fall 2007 at (<http://cshcndata.org/Content/Default.aspx>).
- 37 Ibid. Data Resource Center for Child and Adolescent Health.
- 38 op. cit. (9); Alan Gruskin, et al., 1231.
- 39 S. Andrew Spooner, et al., "Telemedicine: Pediatric Applications," *Pediatrics*, Vol. 113, No.6 (2004): e639-e643 (<http://pediatrics.aappublications.org/cgi/reprint/113/6/e639>); *Pediatric Telehealth Colloquium* (UC Davis Health System, 2006).
- 40 Alexander A. Kon and James P. Marcin, "Using Telemedicine to Improve Communications During Paediatric Resuscitations," *Journal of Telemedicine and Telecare*, Vol. 11, No. 5 (2005): 261-264.
- 41 James P. Marcin, et al., "Use of Telemedicine to Provide Pediatric Critical Care Inpatient Consultations to Underserved Rural Northern California," *Journal of Pediatrics*, Vol. 144, No. 3 (2004): 375-80.
- 42 Kourosh Parsapour, Assistant Professor of Pediatrics, Pediatric Critical Care, UC Davis Children's Hospital, Conversation with author, 1 Mar. 2007.
- 43 Daniel Plotkin, eHealth Program Administrator, Childrens Hospital Los Angeles, Email to author, 15 Jun. 2007.
- 44 Dorota T. Kopycka-Kedzierawski and Ronald J. Billings, "Teledentistry in inner-city child-care centres," *Journal of Telemedicine and Telecare*, Vol. 12, No. 4 (2006): 176-81.
- 45 Digital Cameras and Internet Ease the Pain of Oral Disease, University of Rochester Medical Center, 20 Jul. 2006, 29 Jun. 2007 (<http://www.urmc.rochester.edu/pr/news/story.cfm?id=1183>).
- 46 See for example, Ira Krumholtz, "Results From a Pediatric Vision Screening in its Ability to Predict Academic Performance," *Optometry*, Vol. 71, No. 7 (2000): 426-430.
- 47 Pediatric Vision Screening Using Telemedicine, 30 May 2007 (<http://cla.utsi.edu/Research/Biomedical/Pediatric.PDF>); Ying-ling Chen, et al., "Computer Real-Time Analysis in Mobile Ocular Screening," *Telemedicine and e-Health Journal*, Vol. 12, No. 1 (2006): 66-72.
- 48 Mary Klee, Telemedicine Coordinator, Shasta Community Health Center, Conversation with author, 18 Jun. 2007.







- 49 Stacey Cole, Analyst III, UC Davis School of Medicine, Center for Health and Technology, Conversation with author, 6 Jun. 2007.
- 50 Merle McPherson, et al., "A New Definition of Children With Special Health Care Needs," *Pediatrics*, Vol. 102, No. 1 (1998): 137-139.
- 51 Karen Alguis, et al., *The Family Voices in SCHIP Telemedicine Report: Bridges, Not Boundaries: The Value and Use of Telemedicine for Children/Youth with Special Health Care Needs* (Albuquerque, NM: Family Voices, 2003) 10-19.
- 52 Roger Cook, Kern Regional Center, Conversation with author, 6 Jun. 2007.
- 53 Robert J. Waters, *The Role of Technology in Pediatric Home Care*, 12 May 2007 (<http://www.drinkerbiddle.com/files/Publication/0e1b589a-323e-40ba-ba59-a88c63b8417e/Presentation/PublicationAttachment/5ea07431-ca14-4cb0-bedd-abe4f5a398e8/HCGR2005-0905-CARINGWATERS.pdf>).
- 54 Administration for Children and Families, "Florida First to Use Telemedicine to Evaluate Alleged Child Abuse," *Children's Bureau Express*, Vol. 2, No. 4 (Jul./August 2001), 5 May 2007 (http://cbexpress.acf.hhs.gov/articles.cfm?issue_id=2001-07&article_id=300); op. cit. (40); Candace Sadorra, Pediatric Telemedicine Program Administrator, UC Davis Health System, Conversation with author, 20 Mar. 2007.
- 55 Cary Kreutzer, Community Education Director, USC University Center For Excellence in Developmental Disabilities, Children's Hospital Los Angeles, Conversation with author, 11 April 2007.
- 56 James E. Gray, et al., "Baby CareLink: Using the Internet and Telemedicine to Improve Care for High-Risk Infant," *Pediatrics*, Vol. 106, No. 6 (2000): 1318-1324.
- 57 Jonathan Mesinger, Clinics Manager, San Mateo Medical Center, Conversation with author, 18 Jun. 2007; County of San Mateo, "San Mateo Medical Center Awarded for Technology Innovations: New Technology Improves Patient Care and Reduces Cost," press release, 15 Aug. 2006.
- 58 QT-P16. Language Spoken at Home: 2000," U.S. Census Bureau, 17 July 2007 (http://factfinder.census.gov/servlet/QTTable?_geo_id=04000U506&-qr_name=DEC_2000_SF3_U_QTP16&-ds_name=DEC_2000_SF3_U).
- 59 HCIN Fact Sheet, Health Care Interpreter Network, 12 May 2007 (http://parasandassociates.net/books/HCINFactSheet3_07.pdf).
- 60 op. cit. (23); Fran Turisco and Jane Metzger, 7.
- 61 Susan Ferrier, Director of Telehealth, Northern Sierra Regional Health Network, Conversation with author, 5 Jun. 2007.
- 62 TeleKidcare, Center for Telemedicine and Telehealth, Kansas University Medical Center, 5 Jul. 2007 (<http://www2.kumc.edu/telemedicine/programs/telekidcare.htm>).
- 63 Pamela Whitten, et al., "TeleKidcare: Bringing Health Care Into Schools," *Journal of Telemedicine and Telehealth*, Vol. 4, No. 4, (1998): 335-343; University of Kansas Medical Center, "TeleKidcare," Best Practice Initiative, U.S. Department of Health and Human Services, 2003, 12 May 2007, (http://www.ihs.gov/hpdp/Documents/telekidcare_kansas.pdf#page=1).
- 64 Kenneth M. McConnochie, et al., "Telemedicine Reduces Absence Resulting From Illness in Urban Child Care: Evaluation of an Innovation," *Pediatrics*, Vol. 115, No. 5 (2005): 1273-1282.
- 65 Hard Data Backs Up Value of Pediatric Telemedicine Program: Results Help Fuel Expansion, Create New Model of Care for Families, University of Rochester Medical Center, 2 May 2005, 29 Jun. 2007 (<http://www.urmc.rochester.edu/pr/news/story.cfm?id=776>).
- 66 Ibid.
- 67 op. cit. (64); op. cit. (65).
- 68 Stanford School of Medicine, "SCOPE: A quick look at the latest developments from Stanford University Medical Center," *Stanford Medicine Magazine*, Winter 2003 (<http://stanmed.stanford.edu/2003winter/scope.html>); David A. Bergman, et al., "The Use of Telemedicine in the Schools To Improve Access to Expert Asthma Care for Underserved Children," Abstract from Pediatric Academic Societies Meeting, Washington, D.C., vol. 57: 224 (2005).
- 69 Ibid. David A. Bergman, et al.
- 70 See, for example, Kenneth M. McConnochie, et al., "Effectiveness of Telemedicine in Replacing In-Person Evaluation for Acute Childhood Illness in Office Settings," *Journal of Telemedicine and e-Health*, Vol. 12, No. 3 (2006): 308-316; Kourosh Parsapour, Assistant Professor of Pediatrics, Pediatric Critical Care, UC Davis Children's Hospital, Conversation with author, 1 Mar. 2007.
- 71 Medi-Cal Medical Services Provider Manual, Part 2 – General Medicine (GM), Medicine: Telemedicine (http://files.medi-cal.ca.gov/pubsdoco/publications/masters-MTP/Part2/mednetele_m01o03.doc).
- 72 Jennifer Lind, NSRHN Telemedicine Site Coordinator Survey and Training Recommendations (Nevada City, CA: Northern Sierra Rural Health Network, Jul. 2005).
- 73 Frank Anderson, Telemedicine Coordinator, Open Door Community Health Centers, Conversation with author, 29 Mar. 2007.
- 74 Research – Cost Analysis, Kansas University Medical Center, Center for Telemedicine and Telehealth, 15 May 2007, (<http://www2.kumc.edu/telemedicine/research/costanalysis.htm>).
- 75 Ibid.
- 76 Sandra Young, *The Value of Interactive Telehealth in a Disease Management Program*, PowerPoint (Pitt County Memorial Hospital, University Health Systems of Eastern Carolinas) Jul. 2007 (<http://www.atmeda.org/Forum2003/Presentations/Young.ppt>).
- 77 Thomas S. Nesbitt, et al., "Rural Outreach in Home Telehealth: Assessing Challenges and Reviewing Success," *Journal of Telemedicine and e-Health*, Vol. 12, No. 12 (2006): 107-113.
- 78 ATA Telemedicine Cost Efficiency, American Telemedicine Association, 14 Jul. 2007 (<http://www.americantelemed.org/news/mediaguide/costefficiency.htm>).
- 79 California's Medi-Cal program estimates spending \$139.9 million for medical transportation in 2006-07, from Fiscal Forecasting Data Management Branch, State Department of Health Services, Medi-Cal May 27 Local Assistance Estimate for Fiscal Years 2006-07 and 2007-08 (Sacramento, CA: California Department of Health Services, 2007) 6.
- 80 James P. Marcin, et al., "Financial Benefits of a Pediatric Intensive Care Unit Based Telemedicine Program to a Rural Adult Intensive Care Unite: Impact of Keeping Acutely Ill and Injured Children in Their Local Community," *Journal of Telemedicine and e-Health*, Vol. 10, No. 2 (2005): 1-5.
- 81 Ibid.
- 82 What is telepharmacy, North Dakota, Telepharmacy Project, 12 May 2007 (<http://telepharmacy.ndsu.nodak.edu/>).
- 83 Karen Alguis, et al., *The Family Voices in SCHIP Telemedicine Report: Bridges, Not Boundaries: The Value and Use of Telemedicine for Children/Youth with Special Health Care Needs* (Albuquerque, NM: Family Voices, 2003) 21.
- 84 Blue Cross of California, *Blue Cross of California Telemedicine Program: Summary* (Blue Cross of California) 26 Jun. 2007.
- 85 Pamela Whitten and Brad Love, "Patient and provider satisfaction with the use of telemedicine: Overview and rationale for cautious enthusiasm," *Journal of Postgraduate Medicine*, Vol. 51 No. 4 (2005): 294-300 (<http://www.jpgmonline.com/text.asp?2005/51/4/294/19243>).
- 86 Ibid.; James P. Marcin, Telemedicine in the Pediatric Outpatient Setting, PowerPoint (UC Davis Children's Hospital) 19 May 2007; Jana Katz-Bell, Assistant Dean, Administration, School of Medicine, UC Davis Health System, Conversation with author, 1 Mar. 2007; Blue Cross of California, *Blue Cross of California Telemedicine Program: Summary* (Blue Cross of California) 26 Jun. 2007.
- 87 op. cit. (84).
- 88 op. cit. (85); James P. Marcin, Associate Professor, UC Davis Children's Hospital, Conversation with author, 28 Mar. 2007.
- 89 Paul Sharek, Assistant Professor of Pediatrics, Stanford School of Medicine, Conversation with author, 5 Jul. 2007.
- 90 Executive Order S-12-06, Office of the Governor, State of California, 24 Jul. 2006, 30 May 2007 (<http://gov.ca.gov/index.php?/print-version/executive-order/2616/>); "Twenty-First Century Government; Expanding Broadband Access and Usage in California," Executive Order S-21-06, Office of the Governor, State of California, 27 Oct. 2006, 30 May 2007 (<http://gov.ca.gov/index.php?/executive-order/4818/>); Executive Order S-06-07, Office of the Governor, State of California, 14 Mar. 2007, 30 May 2007 (<http://gov.ca.gov/index.php?/executive-order/5626/>).
- 91 op. cit. (25) 21-22.
- 92 Bridget Hogan Cole, Director, IT and Special Projects, Comprehensive Community Health Centers, Inc., Conversation with author, 11 Jul. 2007; Blue Cross of California, "Chapter 8: Claims and Billing: Blue Cross of California Healthy Families Billing," *Telemedicine Provider Operations Manual* (Blue Cross of California) 11 Jul. 2007 (http://www2.bluecrossca.com/bcc_state/tm/info/claims_billing_hf.pdf).
- 93 Health Care Excel, "Medicaid Reimbursement," *Telemedicine and Telehealth Tool Kit* (March 2005) 11 Jul. 2007 (http://www.hce.org/Education/ToolKits/Telehealth_Toolkit/08_REIMBURSEMENT/05-Medicaid.pdf); Bridget Hogan Cole, Director, IT and Special Projects, Comprehensive Community Health Centers, Inc., Conversation with author, 11 Jul. 2007.
- 94 See for example, "Cultivating Rural Health Care: Inaugural Rural-PRIME students will begin classes this fall," UC Davis Health System Faculty Newsletter, June-July 2007: 1, 5-6.
- 95 National Health Service Corp: Information for Students and Clinicians, National Health Service Corp, 11 Jun. 2007 (<ftp://ftp.hrsa.gov/nhsc/factsheets/Information-for-Students-and-Clinicians.pdf>).
- 96 Herman Spetzler, CEO, Open Door Community Health Center, Conversation with author, 19 Jun. 2007; Thomas S. Nesbitt, Executive Associate Dean, Administration and Clinical Outreach, UC Davis School of Medicine, Director, Center for Health and Technology, Conversation with author, 21 Jun. 2007.

Other Resources From The Children's Partnership




E-Health Resources:

-  *Meeting the Health Care Needs of California Children in Schools and Child Care: Telemedicine Can Help* (July 2007)
-  *E-Health Snapshot: Harnessing Technology to Improve Medicaid and SCHIP Enrollment and Retention Practices* (May 2007)
Available at: <http://www.childrenspartnership.org>



Digital Opportunities Research and Resources:

-  *Helping Our Children With Disabilities Succeed: What's Broadband Got To Do With It?* (July 2007)
-  *Helping Our Children Succeed: What's Broadband Got To Do With It? Number 1, 2nd Edition* (March 2007)
-  "A Digital Opportunity Action Plan - California Competes: Deploying Technology to Help California Youth Compete in a 21st-Century World" (May 2006)
-  "Digital Opportunity for America's Youth: State Fact Sheets" (September 2005)
-  *Measuring Digital Opportunity for America's Children: Where We Stand and Where We Go From Here* (June 2005)
-  *Impacts of Technology on Outcomes for Youth: A 2005 Review* (June 2005)
Available at: <http://www.techpolicybank.org>

Content By and for Underserved Communities:

-  *The Search for High-Quality Online Content for Low-Income and Underserved Communities: Evaluating and Producing What's Needed – An Issue Brief and Action Plan with Research Appendices* (October 2003)
-  *Online Content for Low-Income and Underserved Americans: An Issue Brief* (June 2002)
-  *Online Content for Low-Income and Underserved Americans, The Digital Divide's New Frontier: A Strategic Audit of Activities and Opportunities* (March 2000)
Available at: <http://www.contentbank.org>

Parents Guides and Child Safety on the Internet:

-  "A Parent's Guide to Online Kids: 101," PowerPoint Presentation (February 2006)
-  *The Parents' Guide to the Information Superhighway: Rules and Tools for Families Online, 2nd Edition* (May 1998)
Available at: <http://www.childrenspartnership.org>

The Children's Partnership (TCP) is a national, nonprofit organization working to ensure that all children—especially those at risk of being left behind—have the resources and the opportunities they need to grow up healthy and lead productive lives. The Children's Partnership focuses particular attention on the goals of securing health coverage for uninsured children and ensuring that the opportunities and benefits of digital technology reach all children and families. TCP's newest program, "Defining and Promoting an E-Health Agenda for Children," aims to harness Information & Communications Technology to improve the health of America's children. For more than a decade, The Children's Partnership has advanced its goals by combining national research with state-based activities that translate analysis into local action.



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