



CHILDREN'S HEALTH FUND

## 15 MILLION KIDS IN HEALTH CARE DESERTS Can Telehealth Make a Difference?

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The Second in a Series of White Papers on Technology and Child Health  
By the Samsung Innovation Center at Children's Health Fund

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# EXECUTIVE SUMMARY AND RECOMMENDATIONS

## THE PROBLEM

While the Affordable Care Act (ACA) significantly expands health care coverage, insurance does not guarantee access. Particularly for vulnerable populations, including children, a limited and maldistributed supply of health providers keeps health care out of reach for many. Families may lack transportation resources to get to a health care site, especially in areas with too few health professionals—often federally-designated a Health Professional Shortage Area or HPSA—impeding timely access to services even for children with health insurance. Such gaps reduce access to preventive services, urgent care, and subspecialists. They can increase costs when non-emergency care is sought in a hospital emergency department, or when lack of medical attention later contributes to expensive and complex problems.

## UNDERSTANDING TELEHEALTH'S POTENTIAL—FROM THE FRONTLINES

Telehealth can be part of the solution in overcoming access barriers. From rural desert primary care clinics to urban snow-ridden emergency departments, the diverse voices in this report provide firsthand perspectives of how telehealth tools are bringing critical health services to children. Each story's examination of the strengths, challenges, and aspirations of telehealth is different. But collectively, they reveal a single theme: telehealth technologies present significant opportunities to transform pediatric care and reduce health disparities.

## BENEFITS FOR CHILDREN

The cases in this report demonstrate substantial clinical care benefits from telehealth, particularly when used in the context of a medical home. However, full appreciation of the potential value of telehealth for economically-disadvantaged pediatric populations requires recognition of both its direct and indirect impact. Direct benefits include:

- Expansion of the matrix of health and mental health care services as part of enhanced safety net capacity;
- Improved ability to respond to the comprehensive health care needs of children with chronic and complex health conditions;
- Timely access to expertise in urgent/emergent cases where specialists are otherwise regionalized;
- Increased availability of resources gained and repurposed as a result of savings from telehealth driven efficiencies;
- Strengthened connectivity and cohesion between community-based providers and larger partner institutions; and
- Enhanced provider education and mitigation of professional isolation experienced by providers in rural locations.

Each of the aforementioned benefits broadens the reach and elevates the performance of the care network serving poor children.

## BENEFITS FOR FAMILIES AND COMMUNITIES

We also learn from this compilation of experiences that the benefits yielded through telehealth integration can extend into the very fabric of communities and families served. At the micro-level, telehealth can enhance the quality of life of children and families in or near poverty, providing them access to a spectrum of health/mental health care professionals and specialists that may have previously been beyond reach.

Inasmuch as it reduces or eliminates burdensome travel and workforce shortages, telehealth access can help children miss fewer appointments, allowing chronic conditions like asthma to be better managed, resulting in fewer costly emergency room visits and fewer school days missed. Working parents can benefit when telehealth enables them to miss fewer workdays because of sick children. When implemented well, the cumulative value of these benefits is substantial, adding efficiency and increasing the reach of the current workforce. Leveraging advances in technology, telehealth can increase effective communication, increase quality and reduce the burden of barriers to care, such as lack of transportation.

## REDUCING HEALTH DISPARITIES VIA TECHNOLOGY: MAKING TELEHEALTH AVAILABLE EVERYWHERE

As evidenced by this case collection, perhaps the most important consequence of telehealth's steady rise into the mainstream of health care delivery is the potential to advance health equity. Telehealth offers a way to move toward the ideal of every child having access to a high quality, comprehensive medical home model of care, and integrated specialty and emergency care, when needed.

Like the children it serves, telehealth's rapid development is not without growing pains. Implementation of telehealth faces a number of barriers including capital costs of equipment and training, which can disproportionately affect the less resourced practices that would most benefit from it. Similarly in some models, such as direct to consumer, payment/co-pays can be in the range of \$40-\$50 per telehealth visit, making them inaccessible for impoverished families from a financial perspective. Concerted effort must be made to avoid having telehealth become luxury care inaccessible to those most in need. In addition, telehealth is limited by a patchwork of inconsistent regulatory issues surrounding federal coordination, reimbursement, licensing, credentialing and broadband connectivity. There are also concerns around ensuring quality and avoiding fragmentation of care. These issues demand resolution to ensure telehealth is used appropriately but available widely.

While telehealth's full impacts, implications, and impediments in pediatric care will take years to fully assess, these cases allow us to understand where we are and where we are going. Realizing the full potential of telehealth's impact on access and quality of care will require the development of metrics to measure impact and innovative ways of expanding and applying new technologies.

Telehealth is a story of connection. Across states, settings, and specialties, telehealth is linking patients, providers, and institutions. This web of relationships has the potential to improve health care quality and access while reducing costs. Given current challenges in health care—including pediatric primary and subspecialty care workforce inadequacy, the persistence of non-fiscal health access barriers such as transportation scarcity, and political imperatives driving cost control as a priority—now is the time to ensure that telehealth is responsibly interwoven into the safety net for young and vulnerable people.

## RECOMMENDATIONS

1. Break down legal and licensing barriers to expand telehealth programs to cross state lines.
2. Encourage Medicaid and commercial health insurers to cover appropriate, high quality telehealth services for all children, especially those living in HPSAs and other underserved areas.
3. Advocate for experienced child health professional groups to create quality guidelines and standards for telehealth services.
4. Create a national campaign for parents and the public to understand telehealth resources that are available and how access to specialists can be organized for any child in the US.
5. Encourage federal grant support for the development and utilization of telehealth and other technologies to improve access to health care for children.



## INTRODUCTION

Telehealth is transforming the way people receive health care across the United States. With recent advances in broadband coverage and affordable equipment, it is rapidly becoming integrated into primary care, specialty services, and complex health systems. However, many people are still unsure what it is, what quality of care it can provide, and how it could apply to their own health or community.

The growth of telehealth comes at a time of persistent health care access challenges. The implementation of health reform expanded insurance coverage significantly, with over 16 million Americans newly insured.<sup>1</sup> However, 29 million Americans still lack consistent coverage, and coverage does not always equal access.<sup>2</sup> Financial and transportation barriers still keep many people from getting optimal primary, specialty, and even emergency care. Additionally, even for those insured, there are inadequate numbers of providers in many areas of the country.

By far, one of the most compelling applications of telehealth is the possibility of addressing access challenges in Health Professional Shortage Areas (HPSAs) where there is less than one health professional for every 3,500 individuals. In December 2015, more than 6,000 communities or counties had been declared to be a primary care HPSA. It is estimated, in fact, that 15-20 million children live in officially designated Health Professional Shortage Areas.<sup>3,4,5</sup> In areas like these, technologically advanced approaches, like telehealth, can play an essential role in expanding access to otherwise underserved families, including children. It is important to note that many residents in HPSAs do have health insurance. Insurance coverage is necessary but insufficient for getting health care services to children and families who need it.

For no population is getting appropriate care more important than it is for children. Yet lack of access to pediatric-trained health care providers disproportionately affects children living in poverty (16 million) and children in rural areas (13.7 million).<sup>6,7,8,9</sup> The need for trained pediatric providers spans all areas of the health care system, from mental health and outpatient services to lifesaving trauma care. Access to clinicians with pediatric-specific training and experience is well known to affect outcomes, including both survival and quality of life for the child.<sup>10</sup> Telehealth is one way to expand access to the workforce that exists.

We are also entering a new era of patient-centeredness. Technologies can bring health care to the workplace, home, or even school—increasing flexibility in care models that reduce absences from work and school. However, a major concern is that the new opportunities for access and quality may not be available for families with the greatest needs, widening disparities. Low-income families may not have consistent access to the internet, smart phones, or even uninterrupted phone service. Many are not as aware of their rights, or of potential avenues for improved access and quality of services. Often clinical systems serving poor and marginalized populations are underfunded, which presents cost barriers to the newest technologies. As advancing technology facilitates new access, deliberate efforts are needed to ensure inclusion of those most in need.

As with the introduction of any new service, delivery system, or technology, there is always some degree of disruption to existing systems. With telehealth, there are issues of payment, licensing, quality assurance, regulation, and concerns about care fragmentation. All will need to be addressed for optimal adoption of telehealth across the country. But, as summarized in the American Academy of Pediatrics 2015 Policy

Statement on Telemedicine and Workforce Shortages, integrated implementation of telehealth with a child’s primary and collaborating providers has the potential to dramatically improve care, resulting in “more efficient, higher quality, and less expensive care.” Additionally, it can increase the ability for more families to receive quality care in their own communities, reducing the burden of travel.<sup>12</sup>

The focus of this white paper is telehealth in the care of children, particularly those in underserved communities. The goal is to present a variety of case studies to illustrate the scope of use and the potential to create positive change. We have asked a diverse array of health care teams to share their telehealth stories, offering a firsthand account of this technology’s opportunities, needs, applications, and challenges. We hope that readers will gain a deeper sense of the ways telehealth is already being used, and the potential it holds to not only improve care for children across the country, but—if implemented strategically—to decrease health disparities.

## TELEMEDICINE AND TELEHEALTH

The terms “telemedicine” and “telehealth” are sometimes used as if interchangeable; however, each has a somewhat different meaning. The US Health Resources Services Administration (HRSA) defines telehealth as “the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration. Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications.”<sup>1</sup>

The Office of the National Coordinator of Health Information Technology adds, “Telehealth is different from telemedicine because it refers to a broader scope of remote healthcare services than telemedicine. While telemedicine refers specifically to remote clinical services, telehealth can refer to remote non-clinical services, such as provider training, administrative meetings, and continuing medical education, in addition to clinical services.”<sup>2</sup>

Telemedicine is the more limited term, referring specifically to clinical services, generally in a distance communication that has a physician or other health care provider at both ends. Telehealth is the broader term, encompassing additional uses, e.g., patient health education and remote service delivery from allied health professionals (psychology, rehabilitation, nutrition counseling, case management, etc.).

Telehealth is becoming the more commonly used term, including in federal policy. We will primarily use the term “telehealth” throughout this document with the understanding that it includes the services referred to as “telemedicine” as well as other health-related services. However, in the case examples, we have retained the terminology used by the authors.

In practice, telehealth can encompass clinical encounter types ranging from a video-assisted remote visit for counseling to very sophisticated remote monitoring of vital signs, ventilator settings, radiologic scans, cardiac work-ups and assessments of certain kinds of physical manifestations of illness and disease.

## CASES

We begin in rural Arizona, home to over 150 of America's 6,000 federally-designated primary care Health Professional Shortage Areas.<sup>12</sup> Dr. Darlene Melk's account takes us from statistics to the desert realities, presenting a stark portrait of what subspecialty care shortages look like for patients and providers: long drives; lost work; and limited follow-up. Reading her piece, one begins to comprehend the stubborn access challenges post-health reform, and the "what if?" possibilities of using telehealth tools to bring care directly to patients.

### CASE 1: THE NEED FOR TELEHEALTH

#### **Darlene Melk, MD, FAAP**

*Chiricahua Community Health Centers, Inc., Douglas, AZ*

In remote southeastern Arizona, where I am a pediatrician, one of the greatest challenges we face is accessibility to subspecialty care. According to a recent workforce study by the Arizona chapter of the American Academy of Pediatrics, "Depending on the specialty, Arizona has one specialist for every 200,000 to 288,000 children."<sup>1</sup> What does this look like in reality? A visit to the specialist for our families translates to a 125 mile drive each way, an entire day off of work and school, and potentially months on a waiting list. When faced with these costs, all for a 15 minute visit, subspecialist care often does not happen.

Transportation barriers became very real for one of our young patients shortly after her birth. Through a newborn screening, she was diagnosed with congenital hypothyroidism. This very treatable condition requires periodic blood tests to determine the correct dose of medication that is needed in order to avoid long term brain damage. Her grandmother, who was her primary caretaker, was diagnosed with cancer just a few months after the child's birth, and was not able to make the frequent, long trips needed to see the specialist. Doing the best we could, we worked with the baby's 18-year-old brother, who would bring the baby to our local primary care clinic for the blood tests.

Knowing these barriers to subspecialty care, often our only choice is to make phone calls to the specialists to attempt to provide updates and advance their plan of care. These phone calls are made in the midst of a busy day of patient care and often not with the particular specialist who has seen the child, if one exists. This is not the optimal model of care, but at this point in time it is the best that we can offer.

Depending on the specialty, a face-to-face encounter is generally ideal. It allows the patient and family to develop a relationship of trust with the specialist, and to work as a team to make a more customized plan of care. Perhaps someday we can build a workforce of subspecialists who are willing to directly provide care in rural areas such as ours. But until this day comes, telehealth presents an opportunity to bridge this gap in subspecialty care.

Telehealth would eliminate the transportation barriers that many of our families face. It would save a tremendous amount of time for our families and offer the visit in the convenience and comfort of their medical home setting and in their own community. In addition, the specialist could also communicate directly with the pediatrician whenever a more complicated case, needing more hands-on follow-up, arises.

With grant funding, we are currently in the process of setting up our first telehealth pilot program. It is challenging. Some of the barriers for establishing a sustainable program include lack of a reimbursement scheme that pays not only for the specialist’s time, but also for the primary care team who is going to be responsible for scheduling, coordinating and performing the intake for the patients on the day of their visits. In addition, some families perceive that the care they receive “through a television” is inadequate, so it is important to educate them and present care options, when possible.

Overall, we feel that the positive benefits of telehealth will outweigh the negatives and will allow our patients to receive care that is currently out of reach. I am hopeful that we will be able to demonstrate the value of this model of care through our establishment of a pediatric telehealth endocrinology clinic over the coming months.

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Melk’s contribution provides a compelling case for telehealth in pediatric primary care. Working in the rural southwestern US involves supporting patients and families experiencing economic disparities, transportation barriers, and a host of medical and psycho-social challenges. While Melk describes her aspirations for telehealth, we are faced with a series of questions that confront implementers of these promising technologies. Matters of cost and value, acceptance and adoption, and quality of care no doubt come to the mind of those considering the practical and policy implications of telehealth systems.

As we leave Arizona and head northeast into more population- and provider-dense areas, we see how even in resource-rich environments, telehealth offers value—particularly in an emergency context. Waltzman, Wang, and Farrell present a case in which telehealth systems address crisis needs, while also enhancing relationships among institutions. Such institutional collaboration provides a size and scope of distributed services that would be difficult to establish at a community-based provider level alone.

## **CASE 2: SPECIALIZED COLLABORATION IN UNEXPECTED AND SPECIAL CIRCUMSTANCES**

### **Mark Waltzman, MD**

*Boston Children’s Hospital, Boston, MA*

### **Judy Wang, MS**

*City of Boston*

### **Shawn Farrell, MBA**

*Boston Children’s Hospital*

As the largest pediatric specialty-care provider and the only freestanding pediatric hospital in Massachusetts, Boston Children’s Hospital (BCH) plays an essential role in caring for sick children throughout the Northeastern US. BCH is committed to improving access to world-class care for children, while at the same time reducing the overall cost of health care. A growing portfolio of telehealth programs at BCH links hospitals, physicians, and patients together, making the practice of medicine more efficient, expediting timely access to care, reducing overall costs, and increasing patient and family satisfaction.

The BCH Departments of Medicine and Anesthesia/Critical Care have partnered with the Telehealth Program and community hospitals to address the important issue of timely access to pediatric specialty care. Through the TeleConnect Program, BCH provides real-time, interactive, high-definition videoconferencing for on-demand clinical support to community hospital emergency department (ED) clinicians on the stabilization and treatment of critically ill children. In addition to enabling collaboration during acute situations, the platform informs decisions such as the optimal mode of transfer and appropriate disposition at BCH.

South Shore Hospital (SSH), located in southeastern Massachusetts, provides acute, outpatient, home health and hospice care to its local residents. In collaboration with BCH clinicians, SSH's Pediatric ED provides 24/7 pediatric emergency care and receives approximately 20,000 visits per year.

In December 2013, a two-and-a-half-year-old boy was transported to the SSH ED after choking on a pretzel. The boy was in severe respiratory distress when he arrived and the on-staff pediatric emergency physicians determined that his airway needed to be secured prior to definitive care. Local adult medicine specialists from otorhinolaryngology, thoracic surgery and pulmonology were contacted; however, the necessary sized equipment to treat a pediatric patient was unavailable at this community hospital. It became clear that the child needed immediate transport to a tertiary care center for specialty care; the BCH Critical Care Transport team was called. On a typical day, the team can make that journey in approximately 30 minutes. However, the child's arrival at the SSH ED coincided with a major blizzard that had crippled transportation across much of the state. The transport team would not arrive for at least two to three hours, leaving the pediatric emergency physicians at SSH to manage this critically ill boy until the transport team arrived. Fortunately, the pediatric emergency physicians at SSH had access to the TeleConnect telemedicine service for pediatric critical care support.

Through the telemedicine connection, the BCH intensive care specialists were able to see the patient, his cardiac monitor, and ventilator settings. Collaboration between the remote specialists at BCH and the pediatric emergency physicians and respiratory therapists at SSH allowed for minute-by-minute assessments of the boy's respiratory status. The ability to see his respiratory pattern as well as the readings from the monitors and ventilators allowed the remote team to recommend changes to body position, ventilator settings and medications. This level of real-time collaboration would be impossible to achieve over the telephone. When the transport team arrived at SSH three hours after they were called, the patient was stable enough to be transported to Boston.

By the time the child reached BCH, his condition had once again destabilized; he could not be taken to the operating room (OR). His left lung had collapsed, causing his right lung to over-expand. The boy was emergently placed on a machine that directly adds oxygen to the blood (ECMO) and was then taken to the OR, where specialists painstakingly removed the tiny pretzel particles embedded in four out of the five segments of his main airways. After 24 hours in the ICU, the boy was taken off ECMO. His breathing tube was removed within 36 hours, and he was discharged from the hospital five days later—in time to celebrate Christmas with his family. In follow up, the boy experienced no cardiovascular or neurologic deficits from the event.

Although South Shore Hospital has a dedicated pediatric emergency department supported by Boston Children's Hospital physicians, it is limited—like most community hospitals—in the availability of pediatric

specialists, equipment and resources. Local adult medicine specialists often acknowledge that their scope of practice typically does not include procedures intended for children. In this particular case, telehealth enabled South Shore Hospital to access the expertise of pediatric critical care specialists, allowing for a child to be properly stabilized in the community hospital setting over the course of several hours until definitive care could be performed by a qualified pediatric specialist using proper equipment.

With the help of telehealth technology, Boston Children’s Hospital is providing timely access to high quality care in the community hospital setting, with the goal of improving both health outcomes and the patient and family experience. The TeleConnect Program exemplifies how telehealth can expedite access to high quality pediatric specialty care in the community hospital setting and support collaborative clinical decision making in critical situations, leading to improved health outcomes and better patient and family experiences. Telehealth is helping Boston Children’s Hospital deliver the right care, in the right place, and at the right time.

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Waltzman and colleagues offer a dramatic and compelling example of telehealth’s life-saving value. Far from a remote environment, the story they tell takes place in an urban/suburban setting that has been a national model for progressive health care programs. Even in this well-resourced environment, telehealth closes gaps, allowing high-quality care to be provided in the midst of a high-intensity weather and health emergency.

Rheuban, like Waltzman, provides us with a case study that highlights the life-saving potential telehealth holds for a complex case in a tertiary care setting. But the author also introduces us to an additional complexity, well beyond technology: rules and regulations.

### **CASE 3: SOLVING COMPLEX PROBLEMS WHILE MANAGING COMPLEX REGULATORY BARRIERS**

#### **Karen S. Rheuban, MD**

*University of Virginia, Charlottesville, VA*

A two-day-old male infant was referred to the University of Virginia (UVA) Medical Center’s Neonatal Intensive Care Unit for evaluation and treatment of congenital heart disease and respiratory distress. He had been born via caesarian delivery for fetal distress in a rural hospital in West Virginia. Early on the second day of life, he was noted to have difficulty breathing and was transferred to a community hospital with a newborn intensive care unit across the state border for evaluation and management.

Upon arrival, on physical examination, he was breathing rapidly with an elevated heart rate, heart murmur, and low blood oxygen levels. An echocardiogram (heart ultrasound) was urgently performed by an on-site adult cardiologist who identified the presence of an abnormal hole in the middle of the baby’s heart. That echocardiogram was sent via a telemedicine system and reviewed immediately at the University of Virginia, at which time the diagnosis of several other critical heart defects was made. Under guidance of the telemedicine doctor at UVA, the infant was rapidly started on stabilizing intravenous medications and transferred 125 miles to the University of Virginia via our Neonatal Emergency Transport Service. He arrived

in no distress, and with improved blood labs that showed he was circulating oxygen well on the medication. On the fourth day of his life, he underwent a successful surgical repair of his heart and has done well since.

This case demonstrates a number of issues related to the value of telehealth in the acute evaluation and management of newborn infants. Telehealth connectivity facilitated an accurate diagnosis of a complex, life-threatening problem and enabled immediate intervention. This occurred in a community hospital setting in which on-site neonatology services were available but not those of pediatric cardiology. The patient-originating site had a contractual relationship to engage in telehealth with the University of Virginia, allowing services to be provided in accordance with all state and federal statutes and regulations. However, had that same request for pediatric cardiology services been made from the patient's birth hospital in West Virginia, more complex regulatory issues would have been a concern. Licensure, credentialing and privileging, malpractice, technology infrastructure, broadband connectivity and reimbursement all would have presented challenges to the delivery of telehealth facilitated care for that infant in his birth hospital. UVA providers are not licensed to practice medicine across state borders, the infrastructure was not in place to support such an encounter at the birth hospital, there was no agreement that conforms to Joint Commission or Medicare Conditions of Participation standards between the two hospitals, there was no payment for telehealth services by the patient's private insurer, and there was an untested malpractice cap in place.

Nationwide, programs to rapidly identify babies with suspected heart disease through a simple, noninvasive test of blood oxygen have been implemented in rural and urban community hospitals in an effort to advance the timeline for diagnosis and intervention for infants with critical congenital heart disease. With a distribution of pediatric cardiology providers primarily in urban settings, the use of telehealth is a critical adjunct to any such screening program and improved outcomes for infants and children with critical cardiovascular disease. Equally important is the role of telehealth in appropriate triage to avoid unnecessary transfer where applicable, and in facilitating communications between specialists, referring physicians, and patients and their families.

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The extraordinary story and positive outcome for the newborn described by Rheuban again underscores telehealth's value as a tool in tertiary settings and crises. But as she points out, undergirding this success were a set of contracts and formal relationships. Had the child been located across a state border, the story and the outcome could have been radically different. The issues Rheuban outlines: technology, knowledge, and awareness contrasted against border policies and regulatory limitations at state and local levels have a chilling and limiting effect on a nascent life-saving system.

Re-affirming the potential for telehealth as a tertiary care tool, as well as a primary care tool, is the contribution by Sapien and Alverson. The authors, describing an integrated health care system serving a single state, show the unifying power of well-organized telehealth.

## CASE 4: A REGIONAL SYSTEM SUPPORTING A RURAL AREA WHILE MITIGATING HEALTH DISPARITIES

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New Mexico is a majority-minority state with a sparse population, and consistently ranks 49-50th in social determinants of health and child well-being<sup>1</sup>. The State has the largest percentage of Hispanics (46.3%) of any state and the second highest percentage of Native Americans (9.4%). The poverty rate for children in New Mexico is 30% (compared to 22% nationally), ranking third highest in child poverty in the US. This, along with uninsured and underinsured rates, racial and ethnic disparities, and paucity of health care providers hinders access to health care. Furthermore, the State's Level 1 Trauma Center and Pediatric Tertiary Care facility is in close proximity to only 48% of the population.

Approximately 22% of children visit an emergency department annually, but children living in poverty are more likely to utilize this setting for services; 33% of children living in poverty visit an emergency department annually.<sup>2</sup>

The Child Ready-Virtual Pediatric Emergency Department (CR-VPedED), established in 2013, is an offshoot of the Child Ready EMS for Children State Partnership Regionalization of Care. Our approach to regionalization of care is through a community engagement process, facilitating community stakeholder meetings. The community members, all rural or frontier, self-assess how "Child Ready" they are to care for the acutely ill or injured child, from scene to hospital and ultimately transfer to tertiary care should that be necessary. We implemented the CR-VPedED with the communities having an interest in pursuing telehealth consultation in pediatric emergency care for their local facilities. Our goal is to reduce pediatric morbidity and mortality by partnering with patients, communities, health care providers, and facilities to regionalize pediatric emergency care through the CR-VPedED Network.

Often telehealth case presentations revolve around using telehealth to avoid unnecessary transfers. While important, the following case presentation is different. It is about how telehealth facilitated an appropriate transfer, assuring patient safety and promoting family-centered care to a patient and family facing significant challenges with social determinants of health.

R.M. is a three-month-old Hispanic male infant who stopped breathing at home. The mother ran to the neighbors to call 911. The responding police officer immediately began cardiopulmonary resuscitation upon arrival and when the ambulance arrived the baby was breathing, his color returning to normal. The ambulance transported the baby and mother to the nearest emergency department and the police officer transported the mother's four other sons to meet them at the hospital. The emergency department is in a small community hospital with no pediatric services. The emergency physician on duty is board-certified in general emergency medicine. He found the baby having stable vital signs, alert, good tone and pink perfusion. Because of the seriousness of the event the physician decided the baby needed to be transported to the pediatric tertiary care center. The father arrived at the emergency department from

work. Both parents refused transport. The emergency physician started a telehealth consultation with the pediatric emergency department physician to discuss the case and evaluate the baby.

The CR-VPedED physician introduced himself to the parents via telehealth and realized they spoke limited English. Because Spanish was their primary language, he spoke to the parents in Spanish, obtaining the same concerning history. He evaluated the baby via telehealth, remotely examining the baby's skin perfusion, mental status and muscle tone. He told the parents that he agreed the baby needed to be transported. The stress of their baby being transferred became apparent. They had questions about their other four sons, logistics of the ambulance ride and cost. The CR-VPedED physician described details of the transport in Spanish, told them that he would be in the pediatric emergency department to receive the baby and assume care, and they agreed to the transfer. One of the nurses came to the telehealth unit to introduce herself, as she would also be waiting to receive the baby.

When the baby and mother arrived safely in the pediatric emergency department, the CR-VPedED physician greeted them and the mother recognized him from the telehealth consultation. The baby was admitted to the hospital for observation. The father arrived two hours later with clothes for the mom and the diaper bag full of supplies for the baby; he had arranged for a neighbor to care for the other four sons.

This case highlights how telehealth facilitated an appropriate transfer with increased patient and family comfort, and decreased stress for a family facing challenges related to poverty and the social determinants of health.

We have many such success stories, yet still face many challenges as we continue to develop this regional system. Many rural hospitals are undergoing tremendous financial stress, leading to changes in leadership. Therefore, we have had to re-establish contact multiple times with hospitals and new administrators. As our providers have direct patient contact, they must complete the credentialing and clinical privileging process at each originating site; each site has a unique process. Recently, a rural physician expressed strong opposition to telehealth. Due to the difficulty in recruiting and maintaining providers in rural communities, this particular provider wields great influence with hospital leadership and all telehealth activity there has halted despite our efforts to address the concerns.

We began pediatric emergency nursing consultation via the CR-VPedED network and will be conducting weekly check-in rounds with our originating sites. The vision is to change the culture and perception from telehealth in the emergency setting as only for the most critical patients to the reality that it can and should be used for any child the originating health care team has questions about. We continue to strive to use telehealth to regionalize pediatric emergency care.

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Sapien et al provide an ideal view of how telehealth may be used to create a regional support system that addresses issues of income disparity, overcoming complexities in the distribution of health providers, resources, and services, and economic challenges. But the authors also draw our attention to an important point: overcoming a lack of knowledge, comfort, and consistent regulations around telehealth. Opposition

to these systems can come in many forms, often based in a lack of understanding and direct experience. Any health organization seeking to establish a well-integrated and well-used telehealth operation will need to take care to sensitively assess perceptions and address concerns.

Marcin, the author of the next case, is a leader in the pediatric telehealth field. As a practitioner of telehealth for more than 15 years, he has seen the best and worst of what these technologies and systems can bring to health care. Most importantly, he brings an awareness of the data that not only supports the value of telehealth, but the information that can be used to help less knowledgeable participants in the telehealth environment appreciate the benefit and changes that accompany any new tool set.

## **CASE 5: CONNECTING PATIENTS WITH CARE WHILE CONNECTING THE DOTS OF QUALITY, ACCESS, COST \*1**

### **James P Marcin, MD, MPH**

*UC Davis Children's Hospital, Davis, CA*

The UC Davis Pediatric Tele-Emergency Network provides pediatric and neonatal critical care consultations to outside emergency departments and newborn nurseries. There are 26 hospital emergency departments and eight nurseries and neonatal intensive care units connected to the Pediatric Tele-Emergency Network, which allows mostly rural hospitals to connect to pediatric subspecialists at UC Davis Children's Hospital. Data show that the use of telehealth results in higher quality of care, lower medication error rates, and reduced cost of care when compared with telephone consultations, and rural hospitals in particular can benefit from the increased access to care. The UC Davis Pediatric Tele-Emergency Network provides an answer for rural hospitals faced with access and transportation challenges. The UC Davis Pediatric Critical Care team has conducted more than 400 telehealth consultations, and satisfaction with telehealth is high among both family members and referring pediatricians and Emergency Medicine physicians.

In July 2015, the UC Davis Pediatric Tele-Emergency Network was instrumental in saving a baby's life. At a rural regional medical center, a one-week-old baby was brought into the emergency room after becoming cold to the touch and struggling to breathe. The Emergency Medicine physician connected with a neonatologist at UC Davis Children's Hospital, and the neonatologist was able to see and hear the patient and communicate over video with the referring physician. He deduced that the baby was suffering from a cardiac disease common to that age group and was able to recommend medical interventions and lifesaving medications while the transport team was on its way to transfer the patient to UC Davis. Due to distance, the transport team would not arrive for two hours, and the emergency department physician, the local pediatrician, and UC Davis neonatologist stayed connected for more than two hours using telehealth. Because of the interventions, the baby was stabilized while awaiting transfer. By initiating the therapy, the physicians were able to collectively manage the patient in real-time during the two hours awaiting transfer. The local pediatrician, emergency department physician, the neonatologist and the family were quick to say that the telehealth connection helped to save the patient's life.

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Without the telehealth connection, the Emergency Medicine physician at the rural regional medical center would not have had immediate access to a neonatologist while awaiting transfer. The telehealth equipment is easy to use, and it provides a very important opportunity to an underserved population in northern California. UC Davis Children’s Hospital is the region’s only comprehensive hospital for children and has the Central Valley’s only Level I pediatric trauma center and emergency department. The catchment area of the hospital is vast, spanning 65,000 square miles, and many families in the region must travel a distance of many hours to receive subspecialty care.

Tele-emergency care has proven to be effective and, in some cases, critically necessary in saving a patient’s life. As the father of the patient described above said, “If telemedicine saves one life, it’s worth the investment.”

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Marcin offers us a glimpse of the value of telehealth in neonatology and rural practice. During the sensitive period of discharge from a speciality care unit to a child’s home or community, telehealth could also provide a crucial bridge. In reading Marcin’s concluding philosophical ideal, we are left with a sense not only that the myriad benefits of telehealth make it something our health systems and country can afford to implement—but also, fundamentally, we can’t afford not to.

This ideal is well-described in Gwynn’s examples from her own pediatric primary care practice, which serves some of the most high-need and disenfranchised children and families in Florida. Overcoming transportation barriers from a time-sensitive care perspective has been one common theme in the previous cases. Here Gwynn helps us to see the oft-common challenge of transportation even in non-critical circumstances, as well as the value of innovative partnerships.

## **CASE 6: BUILDING A ONE-STOP, FOUR-WHEELED SHOP FOR SPECIALIZED HEALTH SERVICES**

**Lisa Gwynn, DO, MBA, CPE, FAAP**

*University of Miami Miller School of Medicine, Miami, FL*

Millions of US children do not have access to the health care they need. Florida has the nation’s second highest rate of uninsured residents younger than 65 and Miami-Dade County has the second-highest rate of uninsured for the same group.<sup>1</sup> While cost is one of the most publicized barriers to care, it is not always the most pervasive. Getting to the doctor, making appointments, overcoming language and health literacy barriers, and identifying providers are also major hindrances to timely services. For children, these barriers often conspire to turn childhood challenges into lifelong burdens. This is especially the case when a child needs to see a specialty physician.

In 2013, 233 referrals to specialists were made for patients at our pediatric mobile clinic, which provides free primary care to underserved children in the community who struggle with access barriers such as cost and transportation. However, only 35% of these specialty appointments were kept. This was the impetus

for developing a telehealth program designed to connect patients directly to specialists through information technology—with the ultimate goal to reduce health disparities.

Since its inception in 2013, our telehealth program has provided hundreds of children with live pediatric specialist consultations, free-of-charge. Specialties now available include dermatology, cardiology, endocrinology, nutrition, and hematology. By using telehealth to bring these services to the primary care mobile clinic, which parks regularly at familiar settings in the neighborhoods where patients live, the program has made a tremendous difference in the appointment adherence rates, thus improving access.

In the dermatology clinic, highlights of our work include the diagnosis and management of chronic skin conditions, as well as diagnosing unusual rashes and moles seen by the primary care medical team. This is accomplished through both live teleconsultation utilizing video conferencing and a high-resolution video camera which transmits images to the dermatologist in real-time. The diagnosis can be made on the spot and treatment is initiated immediately. In addition, we utilize store-and-forward technology in which photos of skin lesions taken in clinic along with patient medical information are uploaded to an app on a mobile device. The dermatologist responds to the request for consult, reviewing the information and generating a report within 48 hours. This eliminates the need for patients to be scheduled for an appointment with the specialist, whose office is often several hours away from the patient's home, and allows for consultation to assist the primary care medical provider with difficult dermatologic cases.

The telehealth cardiology services now offered from our primary care mobile clinic allows the cardiologist to remotely listen to heart sounds in real-time, read EKG tracings live and to simultaneously talk to the patient, parent, and primary care provider using video conferencing. In addition, echocardiograms are performed utilizing a portable machine that stores the information that is then forwarded to the cardiologist. The most common clinical conditions that have been evaluated include heart murmurs, chest pain, and hypertension. This clinic has been especially rewarding, as there have been many instances where we have been able to provide reassurance to a worried parent of a child with a heart murmur that they are going to be ok.

Another telehealth specialty service that we offer is consultation with a registered dietician. Nutrition counseling is provided to children who are obese, underweight or have special dietary needs. The patients are referred during medical visits on the mobile clinic. After initial teleconsultation, the nutritionist follows up with the patients and families and provides ongoing care to those that need additional therapy.

Our newest addition to our telehealth specialty service line is hematology. Referred children are screened for a variety of blood disorders, including anemia, Von Willebrand's disease, and hemophilia. The goal is to expand outreach efforts to improve the diagnosis of hematologic disorders.

In addition to our specialty services, we are also utilizing different modalities of telehealth to deliver an innovative obesity intervention program. This is an active research study in which we are offering teenagers the opportunity to enroll in a six-month program, which provides a variety of services via telehealth, such as nutrition and endocrinology. The patients are given a cell phone and fitness bracelet and receive weekly text messages promoting healthy living. They are also encouraged to utilize the fitness bracelet phone app which tracks food intake, exercise and sleep patterns. The participants are assigned a health coach who

checks in with them by video conferencing each month through their mobile devices. The patients receive live consultations with mental health medical teams to review goals and monitor progress. The aim of the program is to determine if disease interventions delivered via technology can improve patient outcomes in obese children.

Our telehealth program has allowed us to provide world-class specialty care to children who otherwise would lack access. Feedback from our families has been very favorable and appointment compliance rates have soared to 90%. Our parents are thankful that their child is able to receive services right in the neighborhoods in which they live at the mobile clinic that they call their “medical home.” It doesn’t get much better than that!

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Gwynn writes about a wide-ranging mobile-based primary care program leveraging established sub-specialists to overcome social, economic, and transportation disparities for the children her innovative practice serves. The result is an engaged and healthier community of patients.

Where Gwynn’s drive has created a well-integrated mobile pediatric primary care practice addressing the need for necessary sub-specialists, North breaks new ground by bringing the clinic to the school using telehealth systems. In addition, he introduces non-physician participants into the care delivery process.

## **CASE 7: SCHOOL-BASED TELEHEALTH PROGRAMMING**

### **Steve North, MD, MPH**

*Mission Center for Telehealth and Center for Rural Health and Innovation, Spruce Pine, NC*

When Robert was 11 years old he developed a urinary tract infection. As it worsened, his mother took him to the emergency department at the critical access hospital in their small town. His initial blood pressure was very high, and he was immediately transferred to a children’s hospital 60 miles away. He was seen by pediatric cardiology and nephrology, had a normal echocardiogram and was begun on medication for his elevated blood pressure and elevated cholesterol. Over the next six months, he and his mother traveled up to 60 miles each month for follow-up appointments with pediatric specialists. His blood pressure remained stable and his family decided that routine follow-up visits were not worth the expense in time away from work and money for travel. Over the next year, although his blood pressure remained well controlled, his weight slowly increased into the highest obesity category for children and he stopped the cholesterol medication when he ran out of refills.

Approximately 12 months after Robert stopped his follow-up appointments, the preventive cardiology team began offering services through the school-based telehealth program at his middle school. One of the steps taken by the team was identifying patients who had “been lost to follow-up” in the school districts where they were offering services. The team was able to re-establish Robert as a patient and after three months of seeing the providers on a monthly basis he proudly announced to his family that he had lost seven pounds.

Additionally, his stepmother noted that he was choosing grilled chicken sandwiches over double cheeseburgers and was excited that “my doctor sees me at school.”

Robert lives in the rural mountains of western North Carolina and his school, along with 28 others in four school districts, is part of the Health-e-Schools school-based telemedicine program. In addition to seeing his pediatric cardiologist for scheduled follow up visits he, along with his three siblings, are able to be seen for primary care medical visits by an experienced family nurse practitioner. Visits through the school-based telemedicine program allows Robert and his siblings to receive medical care in the most appropriate setting, while allowing his mother to stay at work.

While providing only urgent care services via telehealth in the school setting may reduce costs and decrease the strain on parents, it will not achieve the true potential of a school-based program. This potential is seen when the clinical program is integrated into the school environment and collaborates with the school to help manage complex biopsychosocial issues and improve population health issues through screening and health education.

Sustainability of a school-based telehealth program is challenging in the current fee for service environment. Unless a program is integrated into a large health system, savings for preventing a non-emergent visit to the emergency department or keeping a parent on the job do not directly generate financial support for the telehealth program. For the long-term financial success of both traditional and telehealth school-based health centers, it is necessary to identify how these programs can support the work of accountable care organizations without excluding students due to the source of their insurance.

Comprehensive school-based health care provides students with access to physical and behavioral health care in the setting where they spend the majority of their time. Traditional school-based health care has strong evidence supporting its efficacy at improving academic and health outcomes. Students who use school-based health centers are more likely to graduate from high school, have fewer absences and feel more connected to their schools.<sup>1,2</sup> Additionally, students using school-based health centers have decreased emergency room utilization, decreased overall health care costs due to improved outcomes for specific health conditions such as asthma and better access to behavioral health care.<sup>3,4</sup> This level of research does not yet exist for school-based telehealth programs and for their continued growth and success it is critical. For school-based telehealth programs to attain sustainability, research must be conducted to support what we see—that the services available to Robert and his siblings make a meaningful impact on their health and academic well-being.

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North’s discussion of a telehealth system that centers on schools—a natural environment for engaging with children and people who know them well—is something of an “aha! moment” for a technology-based system extending health care. Partnering with appropriate people, in this case school nurses, can also directly help to bridge gaps in health professional shortage areas. Like Gwynn, North’s view begins to outline a path that extends telehealth from its traditional emergency and hospital-based settings into a different sort of environment. Driving this theme even further, McConnochie draws out the value of telehealth in broader settings as he describes the challenges and decisions facing the mother of an ill 14-month-old boy. Telehealth’s place in the medical home is well illustrated in this pragmatic solution.

## CASE 8: THE HEALTH-E-ACCESS CONNECTED CARE MODEL

**Kenneth M. McConnochie, MD, MPH**

*University of Rochester, Rochester, NY*

The Health-e-Access Connected Care Model (HeA) is an internet-based, community-wide, network approach to delivering care within the primary-care-medical home. Its mission is to enable health care when and where you need it by providers you know and trust.

To fully comprehend HeA's value, consider the dilemma confronting Lakeisha, a 26-year-old single mother with a welfare-to-work, assembly-line job, when she receives the dreaded call from child care to pick up her 14-month-old son, Roberto. He's been coughing for two weeks now. His child care teacher has brought the cough to Lakeisha's attention before, but this afternoon he's been fussy too, and his temperature is 100.4°F. She tells Lakeisha she must pick him up, and that he can't return without documentation of a physician's approval. Mom has already missed five days of work this winter because of illness in Roberto. Each hour off the assembly line means an hour's less pay. Even worse, after her last lost workday, Lakeisha's boss told her he couldn't keep her if she missed another, regardless of the reason. The only way to have Roberto seen today is an Emergency Department (ED) visit, which requires two buses in both directions and at least six hours altogether. She knows it's not an emergency, that to ED staff she'll just be "the overanxious young mom with the cute baby," and that her other two children need her at home this evening. But the ED is her only choice if she is to keep the job she desperately needs to improve her family's circumstances.

HeA is designed to enable diagnosis and management of acute and chronic problems among preschool and school-aged children in childcare, schools, and other convenient neighborhood settings, and during workday and after-hours periods. A health concern, identified by a parent or by staff in school or childcare, is first brought to the attention of an individual—for example, a telephone triage nurse, who is authorized to request a telehealth visit by contacting the HeA coordinator. The coordinator then contacts a telemedicine assistant, who brings portable equipment to the child site, and a clinician, generally from the child's medical home, who will conduct the visit. Some large child sites have their own equipment, and a site staff-member has served as the telehealth assistant.

The telehealth assistant then elicits history from parents and staff following templates in an electronic medical record and captures clinical observations guided by complaint-specific algorithms. Clinical observations may include images (e.g., tympanic membranes, skin, throat), video clips (e.g., respiratory pattern, infant behavior), lung sounds (via electronic stethoscope) and simple laboratory tests (e.g., rapid Streptococcal antigen). Communication with patient, parents and site staff—essential both for evaluation and management—occurs by phone or, preferably, by videoconference. The clinician assesses the situation, first determining whether diagnostic and management decisions can be made and implemented based on available information. If so, diagnosis and management is discussed with the family and site staff and medications (which can be delivered to child sites) are prescribed, as appropriate. If available information or treatment resources are not sufficient to complete the visit, the clinician facilitates higher level care in the ED or the clinician's office, for example.

Based on evaluation encompassing over 14 years of experience with over 14,000 telemedicine visits, feasibility, acceptability, effectiveness and efficiency of this model for care of children with acute illness are well established.<sup>1,2</sup> Acceptance of HeA by parents, providers and insurance organizations is confirmed by high levels of parent satisfaction with telemedicine in school, child care and neighborhood access sites,<sup>3,4</sup> participation in HeA telemedicine by over 70 different providers from 10 primary care practices,<sup>5</sup> telemedicine access in all Rochester City Schools since September 2010, and reimbursement (at office visit rates) for telemedicine visits by all local payers, including Medicaid Managed Care. For visits by children with a participating primary care practice, continuity of care within the medical home has averaged 83%. Over 97% of telemedicine visits are completed, i.e., less than 3% are referred to a higher level of care for diagnostic procedures or treatment.<sup>3</sup>

Among inner city child care centers with telemedicine, absence due to illness dropped 63%.<sup>6</sup> Children with telemedicine access from child care or elementary school make 22% fewer ED visits than closely matched counterparts.<sup>7</sup> ED visits avoided, per parent estimates, would have taken 4.5 hours on average.<sup>1</sup> For children with severe disabilities attending a child development center, ED visits dropped 50% with HeA availability.<sup>8</sup>

Evidence also suggests that HeA extends equity in access to impoverished, urban families.<sup>9</sup> Prior to HeA availability in child care or school for an urban intervention group, suburban controls made 80% more acute illness visits overall. With HeA availability, this difference subsequently disappeared. For an urban control group, however, the urban – suburban disparity in access remained.

Potential for HeA to replace illness visits at less convenient and more costly access sites is substantial. A study of illness visits in primary care pediatric practice, indicated that 85% of these could be completed using the HeA telemedicine model.<sup>10</sup> Based on analysis of ED visits in multiple upstate New York counties, almost 40% of children's ED visits appear appropriate for care through HeA, and payments for HeA visits (at office visit rates) were one-eighth of payments when these same problems were managed in the ED, reflecting the great potential of this model for cost savings.<sup>11</sup>

Now consider how the common situation confronting Lakeisha would play out if Roberto's child care were participating in a telehealth network that enabled him to be evaluated while in child care by his own primary care physician. The telehealth assistant at child care doesn't hesitate to call Lakeisha about her concerns, knowing the telehealth link to Roberto's doctor allows both quick access to care for Roberto and peace of mind to Lakeisha and herself. As this family's pediatrician, telehealth allows you in your office to see Roberto in childcare, as an alert, vigorous toddler, coughing frequently but in no distress, with no evidence of ear infection, asthma or pneumonia. You reassure his caretakers that his low-grade fever is due to a respiratory virus that poses no more threat to child care staff and other children than any cold virus, and that they can check back in with you if his condition changes. Lakeisha (still at work), the telehealth assistant (at childcare) and you (in your office) are gratified in sharing the happy resolution of this situation via multi-way video-audio connection.

Core characteristics of HeA extend well beyond convenience. Integration within the medical home promotes trust among patients and caretakers and enhances effectiveness and efficiency. Trust is all the

more salient when introducing parents to an unfamiliar approach to care of their children. Continuity leverages established relationships with providers and staff, ensures availability of a complete medical record, creates opportunities for using acute visits to deliver health maintenance services, reduces unnecessary testing, promotes efficient follow-up, and increases patient and provider satisfaction.

HeA addresses incentives for all stakeholders in the care of children. For patients and families, HeA equals or exceeds the convenience and quality of urgent care centers or the ED. HeA enables medical home providers on call to deliver office-equivalent care at any time using low-cost infrastructure while avoiding revenue loss to facilities (e.g., urgent care) outside the medical home. As health care financing shifts to various forms of capitation, providers will be increasingly incentivized to adopt effective, low-cost acute care alternatives such as HeA.

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Maintaining the integrity of the medical home, overcoming staffing and technology challenges, and ensuring the patient and family remain central to the care model are hallmarks of McConnochie's case study. Drawing lines from tertiary care, issues of disparities, economic and geographic barriers, and health crises on through innovative primary care delivery, and extending the care model into schools and daycare are part of what telehealth can afford the nation's health care system.

The next contribution gives us a glimpse into the future. The program described by Hall-Barrow establishes the question, what happens when we extend the care environment directly into the patient's home. Children's Health<sup>SM</sup>, the leading pediatric health care system in North Texas, presents an environment for this next step.

## **CASE 9: VIRTUALLY EXTENDING PRIMARY CARE INTO THE PATIENT'S HOME**

### **Julie Hall-Barrow, EdD**

*Children's Health<sup>SM</sup>, Dallas, TX*

The last decade has become the tidal wave for what those in the telehealth field have always envisioned. The American Academy of Pediatrics' recent technical report lauds the use of telehealth as an effective tool improving the health of children around the world and suggests that it can extend the medical home.<sup>1</sup> The former norm for our telehealth program was trying to convince local providers to try telehealth. Today, we are finding it difficult to keep up with the demand to place technology in the hands of providers.

The rules and regulations surrounding telehealth reimbursement are still cumbersome in many states across the country, including Texas; however, some states are opening the gates to technology to meet the ever demanding need of patient access. The technology to provide telehealth from anywhere and any place continues to evolve on what feels like an hourly basis. However, many private practitioners have solo practices or have limited practitioners and often do not have the luxury to invest in such enterprise systems. Although Children's Health has 20 primary care practices throughout the Dallas-Fort Worth region, our

pediatric partners are critical in our effort to provide telehealth to patients where they need us most: at home. With one out of every nine children in the United States residing in Texas, it is imperative that we address the pediatric need in our state.

During the last 12 months Children's Health has begun to embark on a collaborative effort providing technology at the fingertips of those very physicians who believe that the medical home is essential to keeping kids healthy and well. Children's Health is using telehealth in an effort to enhance virtual access points for our own patients—the same was essential for our community pediatric partners that are clinically integrated with our health system and similarly serve a large percentage of the Medicaid and CHIP population. Similar to centralized hosting of an electronic medical record, Children's Health is hosting a Virtual Visit Platform that is available to over 300 physicians, allowing them to become telehealth providers directly to their patients. This experience will bring care full-circle to their patients and will enhance the relationship that already exists in the medical home. Further, many will now be able to bill for services that have been lost to ERs and urgent care centers for those low-acuity visits that occurred when access to providers was limited or unavailable.

Expanding our own medical home is important as well. Our Children's Health Pediatric Group primary care practices will add the virtual visit program to two sites initially and will thereafter expand based upon need. This opportunity allows the two practices with more disparate geographic locations to connect with patients in a secure accessible modality.

In a related care model, the Children's Health Virtual Visit Program is extending telehealth visits to our own employees. Through our web portal, employees can visit the on-site occupational health clinic where they will be able to have a virtual visit that includes video, audio and up to six peripheral devices to assist in the assessment. This visit occurs in an approved medical site, which enables our employees to utilize the service at their home if they choose to connect after the visit for any new conditions. If our staff is sick or missing work due to low-acuity conditions, we need to take care of them using the same technology that allows us to take care of our own patients.

Although the regulations in Texas are seen as some of the toughest in the country to engage telehealth, Children's Health has collaborated with and engaged practitioners. The use of telehealth offers convenience and the potential for better care as we lead the efforts in delivering health care to our patient and employee populations. Our interoperability with our pediatric partners and clinically integrated networks will make the transition of data for virtual visits the same as our face-to-face interactions. We envision providing health care providers with the most robust telehealth platform, enabling them to connect seamlessly with their patients from home or in their office.

## DISCUSSION

Development and deployment of telehealth offers considerable potential benefits for children who are economically disadvantaged and medically underserved. As previously discussed in this paper and clearly demonstrated in the case studies presented, the synthesis of innovative technology and strategic program development can establish and reinforce telehealth's role in expanding the reach and capacity of the nation's health care delivery infrastructure.

First and foremost, telehealth can help address the major problem of health care access barriers. For the 15 to 20 million children in Health Professional Shortage Areas, telehealth can bridge supply and demand, offering access through technology. Responding to the geospatial challenges associated with a predominantly fixed-site health infrastructure in rural areas, telehealth options can reduce the expense and need for Medicaid-funded non-emergency medical transportation, a growing concern due to the burgeoning need of those newly insured through the Affordable Care Act (ACA).

With access as the first leg on the classic health reform "three-legged stool," the other two legs—quality and costs—are ones where telehealth also has promise. Rapidly emerging in the context of implementation of the ACA, telehealth has drawn attention regarding its potential implications for mitigating health costs, the so called "bending of the health care cost curve." As highlighted in the case studies, through improved care coordination, telehealth programs can offer operational cost savings on the health care delivery side as well as the potential for reducing health expenditures system-wide. Through improved management of chronic care conditions such as asthma and diabetes, telehealth programs can have a significant, ameliorative impact on the rate of health spending growth.

Another noteworthy development is that telehealth programs are poised to step into an important new role as catalyst in the reconfiguration of the post-ACA health care landscape of Accountable Care Organizations (ACOs). Telehealth linkages throughout the networks of community health centers/providers will bind them in collaborative health structures with larger medical institutions (hospital, academic medical centers). These relationships can enhance both the stability of community-based provider networks and their capacity to provide the most comprehensive range of care to those who have traditionally experienced less access to care. Telehealth will also benefit from enhanced recognition and appreciation within the ACA-mandated Community Health Needs assessment process, wherein hospitals are required to demonstrate that community health care priorities are acknowledged and addressed.

Telehealth is advancing rapidly. The gathering momentum within the health sector to reinvent, restructure, and modernize is palpable and promising. However, considerable obstacles and challenges remain that have slowed adoption of telehealth and given way to an uncertain regulatory landscape and contentious professional and public policy debates about issues of federal coordination, quality, potential for fragmentation of care, reimbursement, licensing, credentialing, and broadband connectivity. An additional, significant obstacle is the start-up investment cost of equipment and telecommunications services. Moving forward, these challenges require ongoing analysis and policy action.

The future of telehealth is bright. By continuing to learn from the frontlines about how to maximize telehealth impacts; to push for greater funding and policy flexibility around its expansions; and to train and incentivize providers to incorporate telehealth into the medical home, we can help transform pediatric care while reducing health disparities.

## RECOMMENDATIONS

Children’s Health Fund makes the following recommendations to accelerate the use of new technologies to improve access and quality of health care for all children, especially for the most vulnerable.

1. Break down legal and licensing barriers to expand telehealth programs to cross state lines.
2. Encourage Medicaid and commercial health insurers to cover appropriate, high quality telehealth services for all children, especially those living in HPSAs and other underserved areas.
3. Advocate for experienced child health professional groups to create quality guidelines and standards for telehealth services.
4. Create a national campaign for parents and the public to understand telehealth resources that are available and how access to specialists can be organized for any child in the US.
5. Encourage federal grant support for the development and utilization of telehealth and other technologies to improve access to health care for children



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