Overview on the Challenges and Benefits of Using Telehealth Tools in a Pediatric Population

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Telehealth in Pediatric Medicine presents many of the same benefits and challenges noted in adult-based medicine. In terms of health care delivery, the promise of improving access and reducing costs using telehealth in Pediatrics, particularly chronic care, is high. The ability to address clinician shortages and provide remote guidance for chronic care pathways from pediatric subspecialists to rural-based referring physicians is a developing model that represents a sustainable and cost-effective strategy to improve pediatric care. The adoption and implementation of consistent telehealth programs require a readjustment of current regulatory rules and a national discussion on reimbursement and compliance standards. Presently, state laws generally define the rules, whereby health systems or practices can use telehealth for patient care and education. Long-term telehealth program development depends on the ongoing value and use case provided by pediatric advocates for this emerging health care delivery model.

INTRODUCTION

Telehealth represents a rapidly developing adjunct area in the field of medicine. The essential tenets of telehealth involve connecting patients with physicians/medical providers virtually through Internet and/or cellular technology. Increasing interest has developed in telehealth as a cost-effective health care delivery tool for a number of reasons. These include a (1) direct promotion for use by accountable care organizations, those providing behavioral health care and chronic medical care that was included in the 2010 “Patient Protection and Affordable Care Act,” (2) computer/tablet and smartphone technology has become less expensive and more accessible to the general public, and (3) Internet connectivity has more become reliable and generally available across the country. Current expansion in telehealth can be seen in the increased offering of employee based direct to consumer telehealth, including sites that cater directly to Spanish-speaking individuals (see Uesalud.com) and a focus on developing primary care (including pediatric care) support in underserved/rural-based areas of the country. In particular, telehealth offers promise for improving access to pediatric health care specialists for patients in rural areas and in those with chronic conditions whereby travel may be onerous.

TELEHEALTH TOOLS AND DEFINITIONS

Telehealth is rooted in the older terminology telemedicine. Telecommunications methods such as the phone (telemedicine) have been used in medical care for decades. Indeed, telemedicine and telehealth are often used interchangeably. According to the American Telemedicine Association’s Web site, telemedicine is formally defined as “the use of medical information exchanged from one site to another through electronic communications to improve a patient’s clinical health status.” Telehealth is often used when referring to the use of such technology for clinical and nonclinical care (including teaching). The term itself also refers to a variety of different technologic tools beyond direct synchronous direct virtual care, including remote home-based monitoring tools and asynchronous store and forward technology.

Telehealth visits as they pertain to pediatric care can be broken down into a variety of components/options. Each of these options has its place and function within the health care delivery umbrella.

Virtual visits may be synchronous or asynchronous, ie, they may occur in a “real-time” fashion or in a delayed manner. They may be between providers or between a provider and patient/family. Table 1 outlines these options.

Other tools include the ever-growing area of remote patient monitoring tools. These can take the form of the classic physiologic monitoring (ie, blood pressure cuff monitor) at home which can be interrogated by a health care provider remotely through bluetooth or Internet connectivity to the rapidly growing digital technologies and applications available by smartphone/tablet for wellness and chronic disease management. Other uses include adherence applications, educational material dissemination, and simple 2-way secure texting.

Although all these potential options are exciting in terms of reaching a greater number of individuals that require health care access, there is an ever-growing requirement to make these materials and tools available in other languages such as Spanish to improve health care delivery to non-primary English-speaking individuals. Consideration of these factors in terms of changing demographics in the United States is of considerable importance and should be taken into account when establishing/developing any telehealth program.

In the context of pediatric CKD, in particular ESRD, synchronous virtual care can be used between providers for a...
remote consultation, between a provider and their patient/ family for a remote clinic visit—either initial consultation or as a component of ongoing care and assessment of pre-dialysis/transplant or established dialysis patients (especially those on home therapies). The same platform can be used for group dialysis education and even for potential research enrollment remotely. Ehrlich and colleagues9 established a remote synchronous virtual visit as part of their treatment regimen for a home-based pediatric dialysis patient. This patient was seen “monthly” using real-time secure video technology by the pediatric dialysis care team as part of standard of care and physically face to face every 3 months (per Centers for Medicare and Medicaid Services requirements). The results of their pilot study revealed some exciting results. The patient’s family saved approximately 5000 US dollars over the course of a year just in travel, lodging, and meals. The patient did not miss a significant amount of school (which is key for socialization) and the parents did not miss as much work as they would have normally. From a provider perspective, the dialysis team was able to walk the patient and family through the peritoneal dialysis cycle in a real-time fashion for trouble shooting. The team was able to focus on 1 patient and actually reduced the overall time and cost to care for the patient as the one monthly virtual visit was able to accomplish a complete monthly plan for the patient (including laboratory value review). Improved communication and involvement with the primary care physician was established and overall team communication improved. This patient was never admitted to the hospital and went on to receive a successful kidney transplant. Other considerations for successful implementation gleaned from this pilot included consideration of family expectations and adherence, connectivity, and availability of informational technology and third-party payer agreements.

Asynchronous virtual care may be applied in the setting of CKD/ESRD as well. More often, this would occur between providers. Often this will take the form of “store and forward” consultation and is more likely to be available if the referring and specialist physician are using the same electronic medical record. As an example, this type of consultation could be used when a pediatric nephrologist generated an e-Consult to pediatric surgeon for catheter placement. The surgeon could review the patient’s record and studies and advise the nephrologist on what is needed or other requirements. The nephrologist could have everything completed for the surgeon when the patient arrives to best use everyone’s time and ensure clear plan for the patient’s care. Other examples of store and forward telehealth tools would include image transfer and analysis as would occur in teleradiology.10,11

In terms of remote patient monitoring, few studies focusing on pediatric nephrology patients exist. Currently, the “Take-It” study is using adherence monitoring tools to assess pediatric nephrology kidney transplant patients12 is one of the more anticipated studies. The logical expectation for home-based monitoring tools would include the possibility for earlier intervention and avoidance of the emergency department or hospital admission resulting in lower health care costs and improve patient health. Definitive studies in the area of pediatric nephrology are required to confirm these expectations.

**CHALLENGES**

Despite the predicted and demonstrated growth in pediatric health care professionals adopting and using Telehealth to deliver care,10 there are clear barriers that have impact on adoption of telehealth in general1 and within pediatric nephrology specifically. These include stakeholder (provider/patient/health system) barriers, technologic barriers, state compliance, and legal and financial barriers.13,14

**Stakeholder Challenges**

With the advent and adoption of complex electronic medical records over the past decade, many providers have felt ill-prepared and overwhelmed by systems that were promised to reduce workload and improve patient care.13 Given that many physicians including pediatricians have had increased workload and are now adapting to their new clinic workflows with the electronic medical record, they are not necessarily ready to adopt a new system like telehealth. In such cases, unless there is a very active effort to make telehealth integrated and easy to use, it is rejected by the busy provider. Indeed, the need for familiarity and education of telehealth system operations are also concerns for providers.14 Other concerns include the fear of infringing on other provider’s patient care or potentially adding an unnecessary step when a sick pediatric patient clearly needs to be transferred.15 Telehealth must offer a value-added component over current standard of care to be adopted.

Health systems or practices initiating telehealth programs need to provide a base investment in the technology and then provide an ongoing and available infrastructure (including human resources) to maintain the service network. These costs may be prohibitive for smaller rural centers.12 Often a proforma with a return on investment may be required by the institutional financial team to proceed with developing a telehealth program.

**CLINICAL SUMMARY**

- Telehealth offers a health care delivery modality to improve access and care to pediatric patients with chronic diseases like ESRD.
- The current regulatory environment for conducting Telehealth will need to be revisited to allow maximal utilization of these new technologies.
- Improving accessibility to patients using Telehealth will also require the availability of information and care provision in Spanish and possibly other languages depending on geographical area.
- Technologic education for both providers and patients/families is a key for adoption and implementation of telehealth and remote patient monitoring tools.
In a similar vein, other stakeholders like patients and their families must also be willing and able to participate in telehealth services. This includes understanding their digital literacy and capability to use home-based monitoring tools and virtual medicine platforms and being satisfied with the Health Insurance Portability and Accountability Act security afforded by the network. Pediatric patients with chronic diseases like ESRD and their caregivers/families may well provide an exceptionally strong support base for the development of telehealth tools. However, these patients may not have the socioeconomic resources or the access to sufficient health care providers to develop such tools that may allow them to stay at home and attend school locally.

One of the potential solutions that may present itself to both providers and patients/caregivers is the training, development, and deployment of technology navigators. These navigators could be present in “virtual” form as an “on-line” resource (and also available in other languages such as Spanish) or as a specifically identified individual to contact when first accessing the service or when needed for troubleshooting issues as they come up. The rural United States Department of Agriculture, University of Iowa eHealth Extension Network, provides a common virtual network platform (that can be integrated into the electronic medical record patient portal) that has network support available 24/7. This in conjunction with an identified individual for the specific telehealth service that allows providers and patients/caregivers to access troubleshooting algorithms as needed. The specific set-up and flow that patients and providers would follow would be dependent on the program-specific requirements and geographic locations. They would also be dependent on the resources available from the health system or program implementing the telehealth program.

### Compliance and Legal Challenges

Under the auspices of compliance barriers includes local and state-related issues. On a state level, each state outlines its own guidelines and requirements for telehealth services. In fact, licensure requirements also differ from state to state, and this introduces a significant possible variation in practice. There exists efforts to establish and streamline licensure requirements through developing interstate compacts; however, these continue to be somewhat nebulous in practice presently. Credentialing at specific health care centers is onerous at times and can be significantly time consuming. Although CMS and Joint Commission on the Accreditation of Healthcare Organizations have allowed “credentialing by proxy,” many smaller hospitals have not allowed the use of this option. Although these concerns are not insignificant, it may be of a national interest to allow federally supported programs like ESRD and dialysis to access providers across state borders and reduce the workload for credentialing. There is precedent for such a national approach in the VA programs. Such an approach would allow patients to maintain contact and care with their primary nephrologist when they travel and also address clear shortages in pediatric nephrology availability by improving patient access through telehealth.

Although medicolegal issues are always a concern for providers and health systems, it is unclear as to the impact that telehealth will have on the malpractice systems in place. To date, there does not appear to be an increase in medicolegal risk. Although there are a paucity of pediatric data in the area of malpractice and telehealth, a review by Lilly and colleagues focusing on adult critical care telemedicine has suggested that there may be a reduction in the filing of malpractice suits and hence a reduction in overall costs for health care systems that have adopted scaled ICU telemedicine services. Whether these medicolegal issues also reduce the costs of providing care in the pediatric telehealth world are yet to be realized. It is clear that these issues need to be followed very closely and the costs and more importantly patient outcomes need to be monitored.

### Technological Challenges

Sufficient broadband infrastructure and/or accessible cellular technology are necessary to deliver adequate and consistent virtual care. Many rural and underserved areas do not have the bandwidth to initiate or sustain adequate telehealth services (or teleradiology). Indeed, in our own case for developing our dialysis outreach pilot, a cellular communication network was required to back up to the primary wireless platform to ensure connectivity was maintained. Although cellular technologies provide an effective back up for the Internet-based connectivity, it can add considerable expense to the process.

### Financial Challenges

Of the major barriers, this one may have the largest detriment for adopting telehealth. There is no consistency for reimbursement through commercial payers or state-based Medicaid organizations. Indeed, multiple states have passed parity laws that have improved reimbursement for telehealth services, but again many of these have specific state-focused nuances. Without a consistent...
reimbursement stream, there is a hesitancy in investing in telehealth program although there may be clear benefit to patients. Although some have challenged the concept that telehealth can save money for health care systems compared with standard of care,\(^1\) it likely depends on the nature or the program. A recently published Australian pediatric nephrology-focused study\(^2\) demonstrated that over a 10-year period resulted in a $31,837 (Australian dollars) savings or an average saving of $505 Australian dollars per consultation. The authors conclude that for pediatric nephrology, telehealth is a viable and cost-effective health care delivery strategy.

**BENEFITS**

The promise of telehealth to improve pediatric subspecialty access has really been a driving force behind its adoption. Many champions have emerged, and some health systems (ie, UC Davis) have become pediatric leaders in telehealth.\(^21\)

**Stakeholder Benefits**

The ability of telehealth options to improve the care coverage area for pediatricians and subspecialists into rural areas or areas where the majority of pediatric care is provided by non-pediatricians seems clear. In a study by Marcin and colleagues,\(^22\) effective health care delivery was delivered to pediatric patients with special needs in a rural setting and helped to reduce parental/guardian time spent away from work, reduced travel, and appeared to have impact on use of emergency services. Marcin and colleagues\(^21\) provide a nice overview of the benefits of telehealth utilization for pediatric care in rural populations. Pediatricians and other providers can gain clear benefits from the implementation of focused telehealth programs. The benefits include improved access to specialty care for those practicing in remote communities, provision of consistent care, and use of standardized care pathways for pediatric patients. The provision of ongoing education and support to local providers\(^23\) and maintenance of patients within their own communities\(^23\) are clear benefits of some telehealth programs and may also demonstrate a financial benefit. In fact, health care systems may be able to demonstrate considerable cost savings in such settings by reducing unnecessary transportation, maintaining, and backfilling acute trauma beds and more importantly becoming a clear medical hub that develops into a main referral center for complex patients. It is important that each case for telehealth is adequately reviewed for the potential financial impact. The deployment of telehealth services might also be expected to reduce the reliance of our pediatric patients on emergency medical services. Pragmatically, if we as providers are able to connect with our patients (especially those with chronic conditions like ESRD) in a virtual real-time fashion, we ought to be able to develop an appropriate early intervention plan, a viable follow-up plan, and a strong integrated communication plan, all while being able to effectively evaluate our patient’s health status. This could most certainly reduce the reliance of this patient group on an expensive and already overtaxed emergency department environment for care. These considerations must be weighed in conjunction with improving patient/family access and quality of care. Pediatric patients and families can clearly benefit from telehealth on many levels, and we have demonstrated this utilizing our dialysis telehealth program at the Stead Family University of Iowa Children’s hospital.\(^5\)

**Specific Benefits Pertaining to Pediatric ESRD**

Although no studies exist on the long-term benefits of telehealth use in pediatric ESRD settings, the potential benefits seem intuitive. Much of the payment system for ESRD dialysis care is bundled, so reducing costs may help in making the pediatric care components more financially feasible. The use of home-based monitoring systems (scales, blood pressure cuffs, etc.) and working with industry to access their integrated data components from the dialysis (peritoneal or home hemodialysis) machines should allow improved care for the patients and families while reducing the necessity of their travel to the main care center for troubleshooting. In the same vein, such technologies should reduce travel requirements for nursing and social workers to the patient’s home for full assessments. Using virtual medicine to connect with in-center dialysis patients (at satellite units for larger programs) and their families in real time may also allow improved regular communication between patients/families and the dialysis team. Importantly, current telehealth technologies also allow pediatric patients to connect with their schools during class time and such connectivity is invaluable in terms of maintaining peer connections and school performance.

**CONCLUSIONS**

Telehealth as a health care delivery tool for pediatric care has high promise. The changing reimbursement environment has hastened the move toward health systems and practices adoption of alternative delivery systems including telehealth. Pediatric ESRD care and nephrology care in general lend themselves to telehealth delivery and have the potential to positively impact on our patients/families, providers teams, and our local health care systems. The renal community as a whole has a large research opportunity given the paucity of data available in this area. Developing an appropriate research-based strategy with identified metrics would be a prudent plan. Such strategies could include (1) the comparative effectiveness study of the use of virtual telehealth platforms for replacing institution-based visits for home dialysis patients in terms of patient outcomes, value-based care, and costs, (2) the development and study of agnostic Bluetooth-enabled, home-based monitoring tools (weight scales, blood pressure cuffs and other chronic disease monitoring tools) with smart algorithms (for alerting providers about health related issues) to determine health care resources utilization and identify opportunities to reduce readmissions and emergency department visits, and (3) evaluation of comparative effectiveness of telehealth-based educational opportunities for the ESRD population and how this impacts on health system resource allocation. This brief list provides some ideas for developing a research framework.
for studying telehealth in the pediatric (and adult) ESRD population. It is clear that many other options and possibilities exist in the research arena and that this area is ripe for investigation and federal and state grant support.

REFERENCES


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