The Tell on Telehealth

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Abstract

Objective: Telehealth in epilepsy care is not new. During the COVID-19 public health emergency, telehealth became more readily used to deliver epilepsy care. However, a summarized guidance of use in caring for people with epilepsy utilizing telehealth is needed. Methods: Existing literature was reviewed to provide guidance on various aspects of telehealth. Billing aspects are reviewed. Recommendations and considerations along with benefits and barriers to telehealth are provided. Results: Telehealth can be a preferred delivery route of care for people with epilepsy in specific situations. Examples include psychiatric complaints, medication management, and follow-up visits for noncomplicated epilepsy care. In addition, telehealth is useful for patients who need postoperative visits, are not able to travel, or live in residential facilities. In-person care may be more suitable for patients who are medically complex, have language barriers or difficulty with resource access, hearing impaired, or have neurostimulation devices where remote monitoring or programming options are infeasible. Discussion: Telehealth care for people with epilepsy can be a useful and important method of care delivery. It should remain an option for providers to use in epilepsy clinical care. It is important for the neurology provider to understand the benefits, billing, and barriers to providing telehealth.

Keywords

telehealth, telemedicine, teleneurology, epilepsy, health care delivery

Introduction

It has long been recognized that persons with epilepsy (PWE) may face numerous barriers to specialty care.[1] Reasons for this are multifactorial but certainly include transportation difficulties, geographic barriers, and economic challenges.

Specialty care delivered via telehealth is not new. Chua and colleagues reported in 2001[2] that video telehealth was well accepted by patients during new-patient visits. A retrospective report by Rasmusson and Hartshorn published in 2005[3] demonstrated that video telehealth, using registered nurses at off-site

distant clinics as presenters along with medical provider, could deliver care comparable to in-person epilepsy clinic visits. The technology for delivering high-quality video interactions with patients has advanced in the intervening years, with several United States and global investigators suggesting comparable clinical outcomes using telehealth technology.[4,5] Most early evaluations of structured remote clinic appointments were delivered using video-conferencing technologies that required patients to travel to a site other than their home.

In addition to video-based care, telephonic care is an option in certain circumstances. Bahrani et al conducted a prospective, randomized study comparing telephone-based care with traditional in-person care in a large (n = 429) group of medically stable PWE.[6] Using the clinical outcome of occurrence of breakthrough seizures during the evaluation period, these investigators found no differences in outcome between groups.

More recently, increased adoption to telehealth with technological advances were necessitated during the COVID-19 public health emergency (PHE), thus, allowing for delivery of video-telehealth using devices such as smartphones, tablets, or laptops.[7-11] These reports suggest patient care is not compromised, and patients are satisfied with this modality of care.

In the contemporary era, video and/or telephonic health care offer opportunities to improve outcomes when used as an adjunct to in-person care in PWE. Specifically, these modalities may increase accessibility of providers in specific disciplines and facilitate interprofessional provider consultations (epileptologists, general neurologists, primary care providers, advanced practice providers [APPs], clinical pharmacists, dieticians, psychosocial, and psychiatric care providers) that might not otherwise be possible. From a clinical perspective, opportunities include improving outcomes. An ability to leverage providers in specific disciplines and facilitate interprofessional provider consultations (epileptologists, general neurologists, primary care providers, APPs, clinical pharmacists, dieticians, psychosocial, and psychiatric care providers), exist where otherwise such consultations might not otherwise be possible.

On the other hand, an inability to perform detailed neurological examinations or reduced access to timely laboratory or neurodiagnostic evaluations (eg, EEG) may be obstacles to quality care. In this review, we will address these opportunities, barriers, and suggest approaches that clinicians should consider in advancing telehealth in epilepsy care.

Performing Telehealth in Epilepsy Care

In general, telehealth visits should never be considered a replacement to in-person visits in a traditional setting, but rather as a complementary method. The rate of needing to convert a telehealth to an in-person visit has been reported to be less than or equal to 5%.[9,12] When further analyzing by entry symptoms in neurology, a complaint of epilepsy was overall less likely to need follow-up in-person visits compared to that of back pain and global developmental delay.

Medication Management—Role of Interprofessional Care

It has become increasingly recognized that optimal care of PWE should include a multidisciplinary approach, which can be particularly challenging for patients who do not have access to specialized epilepsy centers. Management of complex, pharmacoresistant epilepsy may further benefit from health care professionals with specific pharmacological expertise or access to clinical pharmacists in the traditional epilepsy clinic setting.[13-16] For example, the National Association of Epilepsy Centers designation for a level 3 or level 4 center includes access to consultation with a clinical pharmacist with expertise in epilepsy.[17] Recently, studies demonstrating positive clinical outcomes including improved medication adherence, medication utilization, adverse effect assessment, and patient education in patients with neurological disorders have been reported in those models where interprofessional care involving either a pharmacist or nurse was available.[18] It has been well established that nurses can provide an important bridge for patients with a variety of disorders via telehealth. During the COVID-19 PHE, nurse-led telehealth was crucial in providing continuity of care for patients with limited in-person access.[19,20] Epilepsy specialty nurses may be valuable in identifying medication adverse effects, and adherence issues.[19,21] Further, the inclusion of pharmacist-led telehealth can improve medication adherence, and overall clinical outcomes in patients with complex medical conditions such as cardiovascular disease, diabetes, and depression.[22-28] Clinics without access to on-site expertise may be able to leverage pharmacists practicing using a telehealth approach.

Benefits for Telehealth Visits

Methods in which care improved via telehealth visit have been elucidated previously in Neurology.[9,12,29,30] The telehealth group of the American Academy of Neurology (AAN) published an overview of the state of telehealth in late 2019; indicating ample support for "new" patients with epilepsy; with benefits to both patient and practitioner.[31] Large scale studies (n > 2000)[9] assessing overall short term safety of pediatric telehealth were later published early in the PHE.[9] Specific analysis of safety in telehealth visits did not indicate any features that might lead to cause admissions within 8 weeks of a telehealth visit at a single center.[32] No study has compared if a particular type of epilepsy is amenable or not for telehealth. However, a study that looked at a comparison of new telehealth consults versus in-person consults demonstrated that patients with headaches and seizures were less likely to need to be seen in-person after a telehealth visit in comparison with patients diagnosed with multiple sclerosis, demyelinating disorders or spinal cord disorders.[33] In another study evaluating 7130 audiovisual telehealth visits at a single center[34]; visits that required patients to be seen in person after an initial telehealth visit were noted in 5% and comprised visits that had associated technological challenges, younger or minority patients, patients

Table 1. Telehealth Versus In-Person Advantages.[1]

Telehealth chosen over in person visits	In person visits chosen over telehealth visits
Psychiatric complaints	Medically complex diagnosis
Medication management (eg, medication adherence and/or assessment of adverse drug reaction following initiation of new ASM or ASM dose adjustment)	Need for multiple providers to see patient
Straightforward follow up visits	Socioeconomic status and language barriers
Post-operative visits	Rural and remote sites with limited broadband capacity
Incapacitated patients that might not be able to travel	Hearing impaired individuals
	Patients with neurostimulation or other devices for which remote monitoring is not possible
Patients in residential facilities	To deliver bad news
Adolescents needing 1:1/private communications	
Patients in research trials where remote testing can be arranged	

who had a lower median household income, and patients who presented with developmental delay or neuromuscular entry complaints.[34]

Barriers to Telehealth Visits

Broadband internet access and digital literacy have now become a social determinant of health.[35] Patient perspectives on how to narrow the digital divide should be considered.[36] Situations where video visits are a challenge, audio visits are still better than no access to care. These situations ideally should be preidentified. Regulatory/legal barriers may exist. Licensing, providing telehealth care to a state or even a country outside of where providers reside, and work represent a few examples. The following table indicates which patients might be best suited for an in-person versus telehealth visit, although post-pandemic data has not been rigorously studied (Table 1).[37]

Telehealth Visit Process

Sinksy et al suggest that a successful telehealth visit requires a workflow that mirrors what outpatient clinics do for in-person visits.[38] In their article, Katyal et al provide detailed instructions on how to perform the neurological exam remotely.[39] The below table offers considerations for a successful telehealth visit (Table 2).

Collection of Quality Measures

Quality measures are typically collected during in-person visits and adoption with telehealth has been slower. The American College of Physicians (ACP) position paper[43] identifies important aspects about quality measures in the telehealth setting. It is important that measures do not discriminate against patients who have poor digital connectivity. The ACP recommends that measures used in both telehealth and in-person visits have similar criteria, that both clinicians and health care systems have access to telehealth information, and that quality measures should undergo analysis to make sure that telehealth data qualifies for inclusion in measures.[43] Sattar and Kuperman provide

a roadmap to capturing the 2017 AAN epilepsy quality measures in a telehealth visit.[41] Screening instruments can be emailed, mailed, or sent via a patient portal prior to the visit or completed during the virtual rooming period. Seizure frequency data may be captured using electronic diaries that can be sent to the provider or via link to the electronic health record (EHR) and incorporated into the visit note.

Counseling via telehealth is as important as is during in-person care. American Academy of Neurology quality measures require education on safety issues and counseling regarding issues such as reproductive health issues where applicable and completion should be documented during the visit.[44] The ILAE recommends discussing occupational and safety issues with patients and educating their families during the telehealth visit.[1] Lua et al created a text-based counseling service and such a service could also be utilized regarding education for topics.[39,45] Samia et al caution that delivering bad news can be more challenging with telehealth and suggests training staff with specific techniques with regard to conveying negative information virtually.[1] In this situation, an in-person visit may be better and advance preparation would be needed to convert if already scheduled as a telehealth visit.

Billing, Coding, and Documentation Tips

Many of the barriers to effective telehealth are operational limitations, rather than concerns about inferiority of telehealth visit quality (Table 3). During the PHE, most of the regulations regarding telehealth practice were relaxed. In 2024 and beyond, it remains uncertain which regulations have been or will be reinstated. Payment policies are widely variable and ever-changing across payers and states. Telehealth raises new security, privacy, and malpractice concerns, which must be adequately addressed to limit risk.

Telehealth policies for Medicare, Medicaid, and private payers are provided yearly by The National Telehealth Policy Resource Center of the Center for Connected Health Policy (CCHP)[46] and updated most recently in fall 2023. Information by state is provided in a user-friendly format. Medicare and Medicaid rules can also be found on the Centers for Medicare

Table 2. Considerations for a Successful Telehealth Visit.[38-42]

Telehealth component	Consideration for a successful visit
Provider/Office preparation for visit	Consider simulated training for providers prior to go live date.[38] Virtual care timeslots should be timed to include time to become familiar with technology.[38] Calls to patient beforehand may be very helpful to elucidate chief complaint(s), medication needs, ability to access telehealth successfully, and trouble shoot as necessary.[39] Facilities should ensure that previsit intake forms do not exclusively refer to cis-gendered individuals.[40] Multiple choice questions should have boxes to provide subjective and multichoice answers as well. Providers and staff could use LGBTQ+ specific training modules. Confirm that patient will access telehealth platform from a state for which provider has a valid medical license If English is not the first language for patient, assure that interpreter services can be added on to the telehealth visit If medical students/other learners are expected in the visit, assure that both learners and preceptors are on the same platform synchronously to attest nature of examination
Patient preparation for visit	The patient should be told before the visit that they may be asked about changes in body weight, medication side effects, current medications (including both ASM and non-ASM, as well as over the counter medications), and seizure frequency so that that information may be ready during the visit.[1] The presence of a witness during the telehealth visit should be emphasized to the patient for seizure frequency and description documentation.[1] In pediatric patients instruct caregiver that patient needs to be present at the time of the visit. In situations where learners are expected/notify patients ahead of time of the situation that they will have multiple video windows open with all participants in visit. The choice of appointment type (virtual, telephone or in-person) should be made by the patient or caregiver.[38] Clinicians may consider having patients complete standardized assessment forms for mood (eg, NIDDI, PHQ9, GAD, Beck, etc) prior to visit if appropriate.
Prior to provider entering visit	Previsit virtual rooming by Medical Assistant (MA) or nurse.[38] MA, nurse, or pharmacist completes standardized questionnaire and medication reconciliation during previsit.[38] In the "asynchronous" model, the MA or nurse virtually rooms the patient then hands off the patient to the provider. They are not present in real time following the visit with the patient and would follow-up with after care recommendations later.[38]
Actual visit with provider	In the "synchronous" model, the MA or nurse stays online during the provider visit to listen and complete tasks that are discussed.[38] Th neurological examination should be completed at the onset of the visit in the case of video failure as the history can then be obtained by phone.[41] Mental status and quality of life can be tested using a standardized questionnaire.[41] Muscle strength can be tested with the assistance of a caregiver.[41] Fundoscopy, reflexes, and sensation would need an in-person visit for proper assessment.[41]
Environment	It is important that the patient and provider be in quiet areas to ensure confidentiality and security of protected health information (PHI). It is important for the patient to be in a room large enough to reliably perform gait testing.[39]
Equipment	An age-appropriate chair should be in place for children.[42] For both adults and children, a flashlight, and odorous substances (for olfaction) could be by the remote patient's side if assessment is needed for these cranial nerves. For children, a smartphone app to play sounds, age-appropriate toys, and balls should be nearby.
Post visit	In the "asynchronous model" following the visit, the MA, nurse, or pharmacist schedule after visit recommendations virtually in real time with the patient or caregiver.

and Medicaid Services (CMS) and Department of Health and Human Services (HHS) websites[47,48] and in the Consolidated Appropriations Act of 2023, H.R. 2617.[49] Major factors to consider in the performance of telehealth are described below.

Types of Activities Allowed via Telehealth

Many evaluation and management (E/M) and procedural services, as described in the Current Procedural Terminology (CPT®) can be provided via telehealth.[50] Centers for Medicare and Medicaid Services publishes an annual list of CPT codes allowed via telehealth, as well as whether the payment decision is temporary or permanent and if the service can be provided as audio-only. Allowed codes include most outpatient and inpatient E/M visits, nursing facility and home visits, behavioral and mental health services, analysis and programming of brain and cranial nerve devices, some rehabilitation services, some health and well-being coaching services, social determinants of health risk assessment and the new complexity add-on Health-care Common Procedure Coding System (HCPCS) code G2211. Billing provider types have also been temporarily expanded until the end of 2024 and include all eligible Medicare providers such as marriage and family therapists, mental health counselors, occupational and physical therapists,

Table 3. Factors Governing Patient and Provider Acceptance of Telehealth.[58]

Technology

- Health care-specific and certified videoconferencing platforms
- Adequate equipment (high-definition webcams or other cameras, speakers, microphones)
- User-friendly and reliable technology platform
- Active IT training and involvement in program
- Availability of technical assistance (both onboarding and troubleshooting)
- Ability to utilize multiple platforms (smart phones, tablets, all major Internet providers)
- Stability of audio and or audio-video conferencing
- High-level security, including access control, authentication protocols, waiting rooms to authenticate users, end-to-end encryption and secure data storage
- HIPAA compliance

Patient

- Knowledge about telehealth and its risk/benefits
- Availability of computer or smartphone
- Availability and cost of high-speed broadband internet or cellular networks
- Standardized patient education regarding effective telehealth
- Video onboarding: ease of starting and navigating telehealth visits (eg, app download required)
- Technical and digital literacy (age, education, reading ability; document in electronic medical record [EMR] for patients)
- Patient cognitive or intellectual disabilities
- Availability of interpreters, close captioning, and chat functionality
- Automated appointment scheduling
- Fear about data privacy and security

Provider

- Adequate physical space for telehealth equipment
- Adequate provider training on platform use
- Virtual rooming and intake by telehealth trained medical assistants
- Cost of platform and features
- Integration with facility EMR and billing systems
- Workflow protocols for scheduling, rooming, intake, follow-up testing, and patient education
- Legal and malpractice concerns

Both patient and provider

- Optimized telehealth environment—private, quiet, well lit, and adequate sound
- Ability to include third parties in visit (family, caregivers, guardians, friends, other providers)
- Ability to share screen, documents and or videos via telehealth platform
- Ability to collect forms, consents, and other signatures via telehealth platform
- Provision of patient education materials and follow-up testing via platform
- Remote patient monitoring and telehealth examination medical devices (tele-ophthalmoscopes and -otoscopes, stethoscopes, blood pressure cuffs, thermometers, oxygen saturation monitors, weight scales)

audiologists, and speech-language pathologists. In addition, activities requiring direct supervision can be provided by audio and video communication rather than solely in-person. State Medicaid and private payers may or may not follow the CMS guidelines, so requirements should be verified with the CCHP, state, or individual payer.

Location

For Medicare, several location policies have been made permanent. These allow Federally Qualified Health Centers (FQHCs) and Rural Health Clinics (RHCs) as eligible distant site providers for behavioral/mental health telehealth services, and Referral Emergency Hospitals as eligible originating sites

for telehealth. In addition, Medicare patients can receive behavioral or mental health services in their home and geographic restrictions for the originating site of behavioral or mental telehealth services have been eliminated permanently. For some services, the policy changes are only temporary, until the end of 2024. These include allowance of FQHC and RHCs as distant site providers for nonmental health telehealth, the ability of Medicare patients to receive telehealth services in their home and deferral of geographic restrictions for originating site of nonmental telehealth. Teaching physicians may use audio/video telehealth (but not audio only) to supervise residents in a 3-way telehealth visit with the residents and teaching physicians in different locations. Finally, there has been a deferral of a requirement for providers to register their homes

as practice locations; for 2024, providers can continue to do telehealth from home and bill from their currently enrolled practice location. Patients used to have to travel to a certain location to access telehealth. The providers location also used to be significant, and doing telehealth from home was not possible previously which has now changed.

Medication and Controlled Medication Prescribing

Most states consider a telehealth visit to be sufficient for establishing a patient–provider relationship and for the prescription of medications. The Drug Enforcement Agency (DEA) and HHS have extended pandemic telehealth flexibilities for controlled medications through the end of 2024, in a policy entitled "Second Temporary Extension of COVID-19 Telemedicine Flexibilities for Prescription of Controlled Medications."[51] Pre-COVID regulations required at least one in-person visit before prescription of controlled medications. The 2024 extension allows providers to prescribe schedule II-V controlled medications via audio-video telehealth, even when the prescribing provider has not performed an in-person evaluation, allowing for uninterrupted epilepsy care and pharmacy support. Final DEA regulations will be forthcoming over the next year.

Telehealth Practice Across State Lines

State licensing requirements for telehealth vary by state. Because the originating site for telehealth is the physical location of the patient, if the patient resides in another state, the provider typically must be licensed in that state. There are some state-by-state exceptions for telehealth practice in contiguous states or provision of temporary services. In general, practitioners who provide frequent services outside of their state of practice should be licensed in these other state(s). Some states have an expedited pathway for full or new telehealth-only licensure. The Interstate Medical Licensure Compact[52] intends to streamline the licensing process and currently includes 37 states, the District of Columbia, and the Territory of Guam. It allows practitioners to file only one application to receive separate licenses (all still requiring licensing fees) from each state of intended practice. For the Veterans Affairs (VA) care, it is possible to have access to specialists across state lines that VA providers in other states.

Documentation

Documentation of the visit is required for reimbursement and should follow guidelines for the comparable in-person service. Most federal and state payers require that informed consent for telehealth, either written or verbal, be obtained from patients, and documented in the medical record. Consent details may be determined by state law and may include a description of telehealth services; disclosure of fees and permission to bill; technology, privacy, and security risks; information about refusal and alternatives; and procedures for emergency and follow-up care. Providers should also document verification of the identity of the patient, confirmation of his/her physical location, and introduction of all other personnel involved in the telehealth session with their credentials.

Reimbursement

Through the end of 2024, CMS will continue covering telehealth at payment rates matching those of traditional E/M visits. Services provided to patients in their home will be reported with place of service (POS) 10, providing a higher nonfacility payment rate. In 2025 and beyond, new telehealth CPT codes will likely be created and valued by the American Medical Association (AMA). Medicaid and private payer coverage varies and can be found at the CCHP website and in payer coverage policies. Some states have now adopted pay parity telehealth laws for Medicaid and private payers. "Payment parity" requires equal payment for in-person and telehealth services. The equally important "coverage parity" requires that in-person services also be covered when delivered via telehealth. Given the rapidly changing environment for reimbursement, it is essential that billing and reimbursement teams be involved in designing and monitoring telehealth program revenues.

Access to Technology

Not all patients are able to engage with telehealth services. While 77% of US adults have home high-speed broadband internet connections, and 85% own a smart phone with cellular service, rates are lower among those with lower income and levels of education.[53] In 2021, 37% of US adults reported utilizing telehealth in the last 12 months, with higher use among female, college-educated, white (as compared to black, Hispanic, or Asian), higher income, and urban patients.[54] Social determinants of health remain an important factor in accessibility and acceptance of telehealth.

Security and Privacy

Telehealth services are vulnerable to a range of security risks, including virus or malware software infections, session access by unauthorized third parties and cybercriminals, and data breaches. All services provided by telehealth must be compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) rules[55] protected health information. Providers should ensure that their telehealth systems/vendors comply with HIPAA and are covered by appropriate business associate agreements. The Office of Civil Rights will likely soon begin enforcing compliance and imposing penalties for telehealth noncompliance with HIPAA rules. Health care providers should perform initial and periodic security and privacy audits ensuring compliance with best practices.

Other Legal and Malpractice Concerns

Telehealth law has lagged. To date, there are few case law examples of telehealth malpractice. Visits by telehealth are considered sufficient to establish a patient–provider relationship and subject to all the malpractice risks of traditional visits including missed diagnosis, failure to diagnose, medication errors, and negligence.[56] Unreliable or unstable telehealth platforms may increase risk by preventing adequate communication between patient and provider. Inability to physically examine the patient may also create gaps in care that increase risk. During the PHE, multiple liability protections were utilized for health care providers; most of these are now expired or expiring. Providers should ensure that the malpractice carrier covers telehealth, and in all states where the provider intends to practice. Some insurance liability policies require a supplemental policy. States may have different minimal coverage limits. Individual state interpretations of telehealth may also affect insurance coverage decisions. Providers should review the state laws and Board of Medicine and other relevant Board regulations for telehealth in intended practice states. Finally, providers should consider whether liability insurance covers technology errors and omissions and cyber liability.

A full set of policies and procedures should be developed for telehealth, addressing the same areas as would be covered for in-person visits. All providers and staff who participate in telehealth should receive comprehensive initial and periodic training. Providers should be credentialed and have clinical privileges to perform telehealth, including at the distant-site hospital (the location of the provider) for hospital-to-hospital activities. A CMS rule indicates that originating-site hospitals (the location of the patient) may rely on credentialing and privilege decisions of the distant-site hospital, but this does not apply to all forms of telehealth.

Providers should also be aware of any state definitions of standard of care for telehealth and should document all histories, exams, and medical decision making fully. The Centers for Medicare & Medicaid Services has good online resources. Such guidelines include defining the patient–provider relationship, obtaining consent, verifying patient identity, and describing prescription medication use. Providers should consider whether some documentation of the telehealth visit needs to be maintained at both originating-site and distant-site hospitals. Finally, telehealth visits are subject to the same rules regarding health care fraud and abuse as in-person visits.

Telehealth Program Assessment

Telehealth platforms differ significantly in their features, integration with the electronic medical record, security, and ease of use. Evaluation of a telehealth platform may be best performed using a structured questionnaire, which can include assessment of feasibility, usefulness, service reliability, technological features, user satisfaction, quality, and cost-benefit.[57] Key performance indicators to assess telehealth program success could include patient and provider satisfaction scores, percentage of successfully completed visits, revenue generation, safety and quality measures, and health outcomes.

Conclusion, Summary, Future Directions, and Gaps

The recent rapid increase in telehealth to provide epilepsy care emerged during the PHE from concerns about spreading infection from the COVID-19 virus during a time following the era that introduced broad availability of internet-based audio-video communication. This historical confluence truly was less significant than it seems because technological changes have always influenced the delivery of health care, and the emergence of telehealth was arguably inevitable. Nevertheless, the rapid change has introduced a need for deliberation on telehealth through the lenses of health care quality, equity, and economics. As discussed in this review, the understanding and implementation of telehealth is continuing to evolve.

Epilepsy care is appropriate for telehealth based on the reliance of ongoing care for interactive communication that includes the patient, the patient's family or companions, and the provider with lesser reliance on detailed physical and neurological examination. This does not mean that telehealth care can adequately serve all epilepsy care because remote interactions miss elements of communication that in-person interactions can provide. In-person communication affords a connection and a clarity that cannot be matched when the individuals are remote, and this degree of communication can be critically important during some clinical conversations. Knowing in advance of an encounter whether a higher level of communication will be needed is confounding, so telehealth carries an intrinsic risk of suboptimal care during some clinical encounters.

Epilepsy care depends upon communication of details that emerge more readily when the provider is experienced or subspecialized in epilepsy, and such providers are not local to many communities, thus further benefiting use of telehealth for epilepsy by allowing convenient access to expert providers without inordinate financial and time costs from travel. Telehealth narrows the epilepsy access practice gap. Nevertheless, telehealth increases the care delivery gap that relates to the *digital divide*. Individuals without ready access to reliable, high-speed internet and appropriate computer or smartphone devices do not benefit from telehealth, and these are often the individuals who were not receiving equivalent access to care before telehealth's expansion. As overall health care evolves to depend more on telehealth, the gap for such individuals may unfortunately widen.

Ultimately, the polishing of implementation will bring telehealth into a utilization that is more convenient and efficient, but considerable concerns and obstacles remain. The rapid introduction of EHRs provides an analogous health care advancement that can yield perspectives on telehealth. Electronic health records promised easy, reliable, and widespread access of individual patient's medical records with the expectation that would improve health care outcomes. The access to

medical records has undoubtedly improved many aspects of clinical decision-making, but EHRs are well recognized to also introduce problems to provider workload, provider–patient interaction, and cost. As such, technological advancements can address one problem without as much benefit as expected while also introducing new problems. Moreover, the introduction of many technologies that increase efficiency with greater consistency, such as in manufacturing, typically come with increasing homogenization and output motivations that often do not serve providers or patients. Just as keystroke fatigue is a factor in physician burnout, the non-stop progression through telehealth visits can lead to an assembly line mindset that in-person, office interactions do not produce.

Telehealth will remain an important component of health care delivery regardless of the regulatory or financial changes that are certain to occur. Attention to telehealth's delivery limitations alongside the fundamental elements of ethical and quality health care delivery also will remain critical. As was expressed during the emerging technology era of the 20th century, continual progress necessitates an intelligent and daily exercise of judgment. The substitution of some personnel with AI may increase the use of telehealth.

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References

1. Samia P, Sahu JK, Ali A, et al. Telemedicine for individuals with epilepsy: recommendations from the International League Against Epilepsy Telemedicine Task Force. *Seizure*. 2023;106: 85-91. doi:10.1016/j.seizure.2023.02.005

2. Chua R, Craig J, Wootton R, Patterson V. Randomized controlled trial of telemedicine for new neurological outpatient referrals. *J Neurol Neurosurg Psychiatry*. 2001;71(1):63-66. doi:10.1136/jnnp.71.1.63

3. Rasmusson KA, Hartshorn JC. A comparison of epilepsy patients in a traditional ambulatory clinic and a telemedicine clinic. *Epilepsia*. 2005;46(5):767-70. doi:10.1111/j.1528-1167.2005.44804.x

4. Haddad N, Grant I, Eswaran H. Telemedicine for patients with epilepsy: a pilot experience. *Epilepsy Behav*. 2015;44:1-4. doi:10.1016/j.yebeh.2014.11.033

5. Ahmed SN, Wiebe S, Mann C, Ohinmaa A. Telemedicine and epilepsy care—a Canada wide survey. *Can J Neurol Sci*. 2010; 37(6):814-818. doi:10.1017/S0317167100051490

6. Bahrani K, Singh MB, Bhatia R, et al. Telephonic review for outpatients with epilepsy—a prospective randomized, parallel group study. *Seizure*. 2017;53:55-61. doi:10.1016/j.seizure.2017.11.003

7. Alipour J, Hayavi-Haghighi MH. Opportunities and challenges of telehealth in disease management during COVID-19 pandemic: a scoping review. *Appl Clin Inform*. 2021;12(4):864-876. doi:10.1055/s-0041-1735181

8. von Wrede R, Moskau-Hartmann S, Baumgartner T, Helmstaedter C, Surges R. Counseling of people with epilepsy via telemedicine: experiences at a German tertiary epilepsy center during the COVID-19 pandemic. *Epilepsy Behav*. 2020;112:107298. doi:10.1016/j.yebeh.2020.107298

9. Rametta SC, Fridinger SE, Gonzalez AK, et al. Analyzing 2,589 child neurology telehealth encounters necessitated by the COVID-19 pandemic. *Neurology*. 2020;95(9): e1257-e1266. doi:10.1212/WNL.0000000000010010

10. Casares M, Wombles C, Skinner HJ, Westerveld M, Gireesh ED. Telehealth perceptions in patients with epilepsy and providers during the COVID-19 pandemic. *Epilepsy Behav*. 2020;112: 107394. doi:10.1016/j.yebeh.2020.107394

11. Datta P, Barrett W, Bentzinger M, et al. Ambulatory care for epilepsy via telemedicine during the COVID-19 pandemic. *Epilepsy Behav*. 2021;116:107740. doi:10.1016/j.yebeh.2020.107740

12. Joshi CN, Yang ML, Eschbach K, et al. Quality and safety analysis of 2,999 telemedicine encounters during the COVID-19 pandemic. *Neurol Clin Pract*. 2021;11(2): e73-e82. doi:10.1212/CPJ.0000000000001025

13. Taube M, Kotloski R, Karasov A, Jones JC, Gidal B. Impact of clinical pharmacists on access to care in an epilepsy clinic. *Fed Pract*. 2022;39(Suppl 1): S5-S9. doi:10.12788/fp.0252

14. Bond CA, Raehl CL. Clinical and economic outcomes of pharmacist-managed antiepileptic drug therapy. *Pharmacotherapy*. 2006;26(10):1369-1378. doi:10.1592/phco.26.10.1369

15. Allen JP, Ludden TM, Walton CA. The role of clinical pharmacists in an epilepsy clinic. *Drug Intell Clin Pharm*. 1978;12(4): 242-244. doi:10.1177/106002807801200410

16. Rahayu SA, Widianto S, Defi IR, Abdulah R. Role of pharmacists in the interprofessional care team for patients with chronic

diseases. *J Multidiscip Healthc*. 2021;14:1701-1710. doi:10.2147/JMDH.S309938

17. Lado FA, Ahrens SM, Riker E, et al; National Association of Epilepsy Guidelines for Specialized Epilepsy Centers Panel. Guidelines for specialized epilepsy centers: executive summary of the report of the National Association of Epilepsy Centers Guideline Panel. *Neurology*. 2024;102(4): e208087. doi:10.1212/WNL.0000000000208087

18. Basaraba JE, Picard M, George-Phillips K, Mysak T. Pharmacists as care providers for stroke patients: a systematic review. *Can J Neurol Sci*. 2018;45(1):49-55. doi:10.1017/cjn.2017.233

19. Bingham E, Patterson V. A telemedicine-enabled nurse-led epilepsy service is acceptable and sustainable. *J Telemed Telecare*. 2007;13(3_suppl):19-21. doi:10.1258/135763307783247446

20. Joo JY. Nurse-led telehealth interventions during COVID-19: a scoping review. *Comput Inform Nurs*. 2022;40(12):804-813. doi:10.1097/CIN.0000000000000962

21. Gulati S, Shruthi NM, Panda PK, Sharawat IK, Josey M, Pandey RM. Telephone-based follow-up of children with epilepsy: comparison of accuracy between a specialty nurse and a pediatric neurology fellow. *Seizure*. 2020;83:98-103. doi:10.1016/j.seizure.2020.10.002

22. Badowski ME, Walker S, Bacchus S, et al. Providing comprehensive medication management in telehealth. *Pharmacotherapy*. 2018;38(2): e7-e16. doi:10.1002/phar.2071

23. Nkemdirim Okere A, Balogun A, Smith A, Stevens J. Association between pharmacist-led telehealth services and improvements in cardiovascular outcomes among patients with cardiovascular risk factors: a scoping review. *Int J Cardiol Cardiovasc Risk Prev*. 2023;19:200206. doi:10.1016/j.ijcrp.2023.200206

24. Cohen LB, Taveira TH, Wu WC, Pirraglia PA. Pharmacist-led telehealth disease management program for patients with diabetes and depression. *J Telemed Telecare*. 2020;26(5): 294-302. doi:10.1177/1357633X18822575

25. May A, Morgan O, Quairoli K. Incorporation and impact of a clinical pharmacist in a hospital-based neurology clinic treating patients with multiple sclerosis. *Int J MS Care*. 2021;23(1):16-20. doi:10.7224/1537-2073.2019-032

26. Lertsinudom S, Tiamkao S, Mungmanitmongkol S, Dilokthornsakul P. Telepharmacy services to support patients with epilepsy in Thailand: a descriptive study. *Heliyon*. 2023;9(2): e13361. doi:10.1016/j.heliyon.2023.e13361

27. Fogg A, Staufenberg EF, Small I, Bhattacharya D. An exploratory study of primary care pharmacist-led epilepsy consultations. *Int J Pharm Pract*. 2012;20(5):294-302. doi:10.1111/j.2042-7174.2012.00207.x

28. Axon DR, Taylor AM, Vo D, Bingham J. Initial assessment of an interprofessional team-delivered telehealth program for patients with epilepsy. *Epilepsy Res*. 2019;158:106235. doi:10.1016/j.eplepsyres.2019.106235

29. Child Neurology Society. "Resource Tool kit for the Child Neurologist in the midst of the COVID-19 Pandemic." 2020. Accessed March 12, 2024. https://www.childneurologysociety.org/wp-content/uploads/2020/11/cns-toolkit-for-telemedicine-apr-5.pdf

30. Grossman SN, Han SC, Balcer LJ, et al. Rapid implementation of virtual neurology in response to the COVID-19 pandemic. *Neurology*. 2020;94(24):1077-1087. doi:10.1212/WNL.0000000000009677

31. Hatcher-Martin JM, Adams JL, Anderson ER, et al. Telemedicine in neurology: telemedicine work group of the American Academy of Neurology Update. *Neurology*. 2020;94(1):30-38. doi:10.1212/WNL.0000000000008708

32. Joshi C, Jacobson M, Silveira L, Shea S, Yang M, Eschbach K. Risk of admission to the emergency room/inpatient service after a neurology telemedicine visit during COVID-19 pandemic. *Pediatr Neurol*. 2021;122:15-19. doi:10.1016/j.pediatrneurol.2021.06.005

33. Watila MM, Duncan C, Mackay G. Evaluation of telemedicine for new outpatient neurological consultations. *BMJ Neurol Open*. 2022;4(1):e000260. doi:10.1136/bmjno-2021-000260

34. Prelack M, Fridinger S, Gonzalez AK, et al; CHOP Neuroscience Center–VOC Research Group. Visits of concern in child neurology telemedicine. *Dev Med Child Neurol*. 2022;64(11): 1351-1358. doi:10.1111/dmcn.15256

35. Benda NC, Veinot TC, Sieck CJ, Ancker JS. Broadband internet access is a social determinant of health! *Am J Public Health*. 2020;110(8):1123-1125. doi:10.2105/AJPH.2020.305784

36. Alkureishi MA, Choo ZY, Rahman A, et al. Digitally disconnected: qualitative study of patient perspectives on the digital divide and potential solutions. *JMIR Hum Factors*. 2021;8(4): e33364. doi:10.2196/33364

37. Chang E, Davis TL, Berkman ND. Differences in telemedicine, emergency department, and hospital utilization among nonelderly adults with limited English proficiency post-COVID-19 pandemic: a cross-sectional analysis. *J Gen Intern Med*. 2023; 38(16):3490-3498. doi:10.1007/s11606-023-08353-7

38. Sinsky CA, Jerzak JT, Hopkins KD. Telemedicine and team-based care: the perils and the promise. *Mayo Clin Proc*. 2021; 96(2):429-437. doi:10.1016/j.mayocp.2020.11.020

39. Katyal N, Narula N, Govindarajan R, Sahota P. Setting up a tele-neurology clinic during COVID-19 pandemic: experience from an academic practice. *Int J Telemed Appl*. 2022;2022:4776328. doi:10.1155/2022/4776328

40. US Department of Health and Human Services. Telehealth for LGBTQ+ patients. 2023. Accessed February 15, 2024. https://telehealth.hhs.gov/providers/health-equity-in-telehealth/telehealth-for-lgbtq-patients

41. Sattar S, Kuperman R. Telehealth in pediatric epilepsy care: a rapid transition during the COVID-19 pandemic. *Epilepsy Behav*. 2020;111:107282. doi:10.1016/j.yebeh.2020.107282

42. Child Neurology Society. Pediatric neurological examination via telemedicine v2. 2020. Accessed February 15, 2024. https://www.childneurologysociety.org/wp-content/uploads/2021/08/Pediatric-Neuro-Exam-via-Telemedicine-Oct2020-v2.pdf

43. Qaseem A, MacLean CH, Tierney S, et al; Performance Measurement Committee of the American College of Physicians. Performance measures for physicians providing clinical care using telemedicine: a position paper from the American College of

Physicians. *Ann Intern Med*. 2023;176(5):694-698. doi:10.7326/M23-0140

44. AAN Quality Measure Set update. 2021. Accessed February 15, 2024. https://www.aan.com/siteassets/home-page/policy-and-guidelines/quality/quality-measures/epilepsy-and-seizures/15epilepsyclinicianmeasuresummary_pg.pdf

45. Lua PL, Neni WS. Feasibility and acceptability of mobile epilepsy educational system (MEES) for people with epilepsy in Malaysia. *Telemed J E Health*. 2012;18(10):777-784. doi:10.1089/tmj.2012.0047

46. Center for Connected Health Policy. The national telehealth policy resource center: understanding telehealth policy. 2024. Accessed January 26, 2024. https://www.cchpca.org/

47. Centers for Medicare & Medicaid Services. List of telehealth services. 2023. Accessed January 26, 2024. https://www.cms.gov/medicare/coverage/telehealth/list-services

48. Department of Health and Human Services (HHS). Telehealth policy. 2024. Accessed January 26, 2024. https://telehealth.hhs.gov/providers/telehealth-policy

49. United States Congress. Consolidated Appropriations Act, 2023, HR 2617. 2022. Accessed January 26, 2024. https://www.congress.gov/117/bills/hr2617/BILLS-117hr2617enr.pdf

50. Centers for Medicare & Medicaid Services. CY 2024 Physician Fee Schedule (PFS). 2023. Accessed January 26, 2024. https://www.cms.gov/medicare/payment/fee-schedules/physician

51. Brinks S, Delphin-Rittmon ME. Second temporary extension of COVID-19 telemedicine flexibilities for prescription of controlled medications. Federal Register. 2023. Accessed January 26, 2024. https://www.federalregister.gov/documents/2023/10/10/2023-22406/second-temporary-extension-of-covid-19-telemedicine-flexibilities-for-prescription-of-controlled

52. Interstate Medical Licensure Compact. About the compact. 2021. Accessed January 26, 2024. https://www.imlcc.org/

53. Perrin A. Mobile technology and home broadband 2021. Pew Research Center. 2021.Accessed January 26, 2024. https://www.pewresearch.org/internet/2021/06/03/mobile-technology-and-home-broadband-2021/

54. Lucas JW, Villarroel MA. Telemedicine use among adults: United States, 2021. Centers for Disease Control and Prevention, National Center for Health Statistics. 2022. Accessed January 26, 2024. https://www.cdc.gov/nchs/products/databriefs/db445.htm

55. Department of Health and Human Services (HHS). HIPAA for professionals. 2021. Accessed January 26, 2024. https://www.hhs.gov/hipaa/for-professionals/index.html

56. Solimini R, Busardò FP, Gibelli F, Sirignano A, Ricci G. Ethical and legal challenges of telemedicine in the era of the COVID-19 pandemic. *Medicina (Kaunas)*. 2021;57(12):1314. doi:10.3390/medicina57121314

57. Hajesmaeel-Gohari S, Bahaadinbeigy K. The most used questionnaires for evaluating telemedicine services. *BMC Med Inform Decis Mak*. 2021;21:36. doi:10.1186/s12911-021-01407-y

58. Al-Faraj A, Ukonu N, Mohtar O, Jha V, Chen DT, Vincent Lau KH. Telemedicine in neurology: challenges and opportunities. *Res Sq* [Preprint]. 2023. rs.3.rs-3470381. Published 2023 October 27. doi:10.21203/rs.3.rs-3470381/v1