During the past decade, efforts have been underway to expand the use of telemedicine, allowing for increased access to healthcare for patients in rural areas, underserved populations and those with chronic health conditions that limit their ability to travel. However, we have been restricted in our ability to effectively implement outpatient telemedicine, largely by constraints in reimbursement. The context of the COVID-19 pandemic has changed this, and outpatient telemedicine has been quickly adopted by many neurology clinics around the world. Policies were recently established by the US Department of Health CARES-Act waiver that allow for payment parity between telemedicine and in-person visits. The flexibility and adaptability of our colleagues and the patients we serve have been extraordinary. This short review highlights multiple relevant studies that have focused on evaluating various movement disorders virtually.

Telemedicine may be synchronous or asynchronous. Synchronous telemedicine is defined as a live interaction between the healthcare provider and the patient, for example, by video conferencing. Asynchronous telemedicine is defined as the storing of information to be transmitted from the patient over a period and in separate time frames, for example with remote monitoring or smart home or digital body sensors.¹

Telemedicine programs, although successful in the setting of acute stroke and inpatient neurology, have not been widely embraced in the outpatient setting previously. Similar to all technologies that rely on an internet connection, there are concerns that factors such as connectivity, file transfer speeds, and resulting video and image quality could contribute to a negative experience. However, studies have reported that when balancing factors such as travel and expenses, telemedicine is favored by both patients and health care professionals.²

Despite the lack of widespread acceptance, however, novel approaches have been suggested to treat and follow individuals with movement disorders. Among these approaches are adapting previously validated rating scales, modifying the collection of data used for evaluation and treatment, and relying on synchronous and asynchronous data (Table).

### Table. Evidence-based Advantages of Using Telemedicine

<table>
<thead>
<tr>
<th>Movement Disorder</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tremor</td>
<td>Use of newer technologies such as digital sensors.</td>
</tr>
<tr>
<td></td>
<td>Assessment through asynchronous telemedicine for intermittent tremors.</td>
</tr>
<tr>
<td></td>
<td>Allows for phenotypical characterization of tremors.</td>
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<tr>
<td>Tic disorder</td>
<td>Suppressible tics can be evaluated through asynchronous telemedicine.</td>
</tr>
<tr>
<td></td>
<td>Helpful for behavioral therapy sessions.</td>
</tr>
<tr>
<td>Dystonia</td>
<td>Allows for diagnostic purposes.</td>
</tr>
<tr>
<td></td>
<td>Helpful in physiotherapy strategies.</td>
</tr>
<tr>
<td>Huntington disease</td>
<td>Reliability in motor assessments.</td>
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<td></td>
<td>Decreases need of traveling for mobility-impaired individuals.</td>
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<tr>
<td></td>
<td>Allows for genetic counseling.</td>
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<tr>
<td>Parkinson disease</td>
<td>Similar or improved patients’ quality of life.</td>
</tr>
<tr>
<td></td>
<td>Reduced travel costs.</td>
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<tr>
<td></td>
<td>Reliable modified version of the UPDRS.</td>
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</tbody>
</table>

Abbreviation: UPDRS, Unified Parkinson Disease Rating Scale

Teleneurology for Movement Disorders

Teleneurologic care for movement disorders can help address a care gap and may improve quality of life.

By Erin Furr Stimming, MD and Jorge Patiño, MD
ease [PD]), which makes travel particularly difficult, is a well-recognized advantage of telemedicine. Evidence shows that more than 40% of people with PD do not receive care from a neurologist, which increases their likelihood of being placed in long-term care facilities, risk of hip fracture, and probability of death. It is imperative that we devise new strategies through telemedicine to better care for these patients. Multiple telemedicine studies focusing on PD, including 5 randomized controlled trials, have shown that individuals with PD who received neurologic care via telemedicine had a similar or better quality of life compared to those who received in-person care. Telemedicine has also been found to be more cost-effective because the costs associated with travel time are eliminated. Although evaluating patients virtually does limit some assessments, relevant data can still be collected. A modified version of the Unified Parkinson’s Disease Rating Scale (UPDRS)—without testing rigidity and postural instability—has been found to be valid and reliable.

In the context of movement disorders, there are some concerns regarding the accuracy of the information that can be retrieved via telemedicine. However, many patients have symptoms and signs that are intermittent or may be more apparent at home and may therefore, require longer observation periods. For example, patients with PD may experience more pronounced freezing of gait at home because of space restrictions, motor fluctuations and intermittent levodopa-induced dyskinesias. Therefore, asynchronous telemedicine can actually provide important, otherwise difficult to obtain, data to guide therapeutic modifications. Newer technologies (eg, digital sensors for kinematics) have been found helpful for the following symptoms, and novel approaches are being studied to improve the rehabilitation process. Newer technologies (eg, digital sensors for kinematics) have been found helpful for the following symptoms, and novel approaches are being studied to improve the rehabilitation process. Among other concerns, individuals with a movement disorder need a comprehensive neurologic examination. For example, when evaluating a tremor, accurate distinction of the frequency, amplitude, and position are imperative. It has been shown that telemedicine effectively allows for this assessment.

Tics

Tics are often less pronounced when the patient is examined face-to-face, therefore, telemedicine could be more helpful for these patients. Some studies have suggested that telemedicine can also be helpful for behavioral therapy interventions to treat tics and reduce the need for frequent repeat visits. Tools like TicHelper.com provide an interactive module treatment program, although this has not been thoroughly evaluated, and additional studies are needed to assess adherence and outcomes.

Dystonia

Synchronous and asynchronous telemedicine can be beneficial but, again, high-quality and high-resolution video is required to avoid missing any details. Patients with dystonia can benefit from an integrated approach that includes multiple interventions. Although there are not many studies regarding the use of telemedicine for the evaluation of dystonia, evidence exists for feasibility of and satisfaction in follow-up care for cervical dystonia after botulinum toxin treatment. The response to treatment may be suboptimal, and underserved areas do not have access to more advanced therapies (eg, deep brain stimulation [DBS] or botulinum toxin). For those who are able to access these effective invasive therapies, telemedicine can minimize the need for frequent follow-up visits. Assessing the efficacy of botulinum toxin injections for a focal dystonia can be performed virtually, allowing for optimizing subsequent injection patterns and dosing. The response to DBS programming can be evaluated remotely, and the patient can adjust their settings with previously set parameters to optimize their therapeutic response. This is particularly relevant in patients with dystonia because the response to neuromodulation is often delayed, highlighting the need for follow-up evaluation and programming, which can be performed virtually.

Huntington Disease

Telemedicine has proven to be helpful in Huntington disease (HD) because mobility impairment and cognitive decline can be obstacles to in-person visits. Reliability of motor assessments via telemedicine compared to in-person care has proven sufficient, and a study reported that telemedicine was being used by almost one-quarter (23.6%) of clinics surveyed. Nevertheless, there may be limitations when assessing subtle features such as saccadic eye movements, tone, and postural stability. For non-motor symptoms, the written portions of the Montreal Cognitive Assessment can be captured by a screenshot. Telemedicine allows for multidisciplinary care and can facilitate remote genetic counseling, which is imperative, particularly for predictive gene testing. Among the advantages of genetic counseling through telemedicine, patients have highlighted the importance of saving money and the feasibility of allowing family members to attend these potentially life altering visits.

Our Future Includes Telemedicine

As medicine evolves, neurologists should be aware of the value of telemedicine in improving access and delivery
of health care, independent of a public health emergency. A study showed that a telementicine curriculum was appreciated by residents and also resulted in better outcomes in medical education. However, participants also agreed that it was more difficult to establish a personal connection with patients using telementicine, suggesting that telementicine will not be able to replace the need for at least some in-person visits.15

Considering the complexity of movement disorders, interdisciplinary approaches are often needed to develop optimal therapeutic plans for the patients. In a study identifying the strengths and obstacles of a telementicine program for patients with movement disorders, a 96% visit completion rate was seen along with reduced caregiver burden and improved self-efficacy and social support.3 Although more information is needed to evaluate the validity of these programs in other sociodemographic scenarios, it is valuable information that can be implemented in a standardized way in movement disorders programs around the globe.

Conclusion
Nothing will ever replace the power of the human touch in healing. However, owing to our current public health emergency and significant advances in technology, virtual visits are not only possible, they are likely the wave of the future. Virtual visits are often preferred by patients not only because of convenience but, during the COVID-19 pandemic, safety and well-being. Care delivered to people in their homes may have multiple safety advantages over in-person visits, especially for those with mobility concerns. Telehealth can ultimately lead to cost savings, more frequent patient-provider communication, and potentially improved adherence to recommended care plans. Advocacy efforts to support continued coverage of this model of care are imperative to guarantee its use in the future. As healthcare and technology evolve, we must continue to adapt to broaden access to high-quality medical care through telementicine. ■

References