

Review

A New Era: The Growth of Video-Based Visits for Remote Management of Persons with Parkinson's Disease

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Abstract. The COVID-19 pandemic forced the abrupt and rapid expansion of an alternative care model that embraces the use of video-based visits in the care of persons with Parkinson's disease. Video-based visits not only eliminate the risk of infection but also reduce geography- and disability-related barriers to accessing specialist care. Research has established that they are feasible, acceptable to persons with Parkinson's disease and patient-centered. In the United States, the relaxation of licensure requirements, adoption of reimbursement parity and investment in telemedicine infrastructure has enabled the rapid growth of video-based visits during the COVID-19 pandemic. Now, we must turn our attention to ensuring that progress made in expanding access to video-based care is not lost and expanded worldwide. More work is needed to identify the optimal video-based care model, establish best practices, and ensure equitable access to care.

Keywords: Parkinson's disease, telemedicine, remote consultation, coronavirus

INTRODUCTION

Over 6 million individuals worldwide have Parkinson's disease (PD) [1] and the prevalence is rapidly increasing, with the number affected by PD expected to double by 2040 [2]. Neurologist care improves outcomes for persons with PD [3, 4] yet access to neurologist care is limited in many areas [4, 5] due to the uneven geographic distribution of neurologists [5, 6]. Access to care is also limited by PD-related disability [7] and driving impairment [8], which can impede travel to clinic. A better model of care is needed in

order to meet the growing demand for neurologist care for persons with PD. Telemedicine, which includes the use of real-time video-conferencing between healthcare providers and persons with PD for clinical care (video-based visits), represents one such advancement in care. By bringing care directly into the home, video-based visits can improve access to care in a patient-centered manner that minimizes the burden on persons with PD and their care partners. The ongoing COVID-19 pandemic, which has resulted in the death of over 1,400,000 people worldwide [9], has created new and urgent impetus to identify alternatives to traditional in-person care. This is particularly relevant for those with advanced PD-associated frailty who may have a higher COVID-19 mortality rate [10]. Here, we review the use of video-based visits for the management of persons with PD

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and future directions. The review focuses on North America and provides a high-level overview of experiences worldwide.

VIDEO-BASED VISITS IN THE CARE OF PERSONS WITH PD

The largely visual nature of the PD examination lends itself well to video-based visits. In-home video-based visits are feasible with visit completion rates exceeding 90% (Table 1) [11, 12]. A modified version of the Movement Disorder Society – Unified Parkinson Disease Rating Scale (MDS-UPDRS) motor examination, excluding assessment of rigidity and postural instability, can be administered remotely [13]. In an analysis of more than 550 video-based PD research visits, 98% of modified MDS-UPDRS motor items were successfully rated [14]. While agreement between video-based and in-person modified MDS-UPDRS motor scores is only moderate [15], this is unlikely to affect clinical care. Common cognitive assessments, including the Montreal Cognitive Assessment, can be administered remotely in PD [16], however, validation is needed. The inability to obtain a complete neurological examination may limit the utility of video-based visits in the care of individuals without an established diagnosis.

Video-based visits are well-received by persons with PD with high overall satisfaction rates (94–97%) [11, 12] and particular appreciation for the convenience and comfort afforded [17]. Video-based visits are also associated with substantial patient time- and travel-savings [11, 12]. Patient interest is corre-

spondingly high; in a survey-based study of over 700 persons with PD, 77% indicated interest in video-based visits with a PD specialist [18]. Pre-COVID, physician satisfaction with [12] and enthusiasm for video-based visits was more tempered, with concerns relating to the technical aspects of visits [17]. Similarly, only 40% of local physicians ($n=89$) for participants in a trial of video-based visits for PD indicated that they would recommend video-based visits with a PD specialist, potentially reflecting poor communication of recommendations [19]. While concerns regarding the ability to establish a personal connection have been raised, in many ways video-based visits afford greater intimacy and insight into a patient's life.

Beyond potentially improving access, video-based visits can be used to deliver tele-rehabilitation services (discussed elsewhere in this special issue), provide psychiatric care, and manage advanced therapies. Follow-up video-based psychiatry care for persons with PD is feasible, improves access to psychiatric care, and is associated with high rates of satisfaction [20]. In a randomized, controlled trial of telephone-based cognitive behavioral therapy (CBT) plus usual care versus usual care for depression in PD ($n=72$), the treatment group demonstrated a significant improvement in depressive symptoms at treatment end that was maintained long-term [21]. A study of video-based CBT for PD depression has been completed but not yet published (clinicaltrials.gov NCT02475954). The feasibility of video-based CBT for PD anxiety ($n=9$) was demonstrated in a recent pilot study [22]. While many procedures cannot be performed remotely, video-based visits can facilitate the management of advanced therapies, including initial titration of levodopa-carbidopa intestinal gel [23], pre-surgical screening of deep brain stimulation candidates [24], and adjustments in deep brain stimulation settings [25].

However, large studies examining the value of usual care plus video-based visits with PD specialists have failed to show an improvement in quality of life. In a large cohort study, PD participants ($n=277$) received a one-time in-home video-based visit with a PD specialist with no significant improvement in quality of life at 6 months [11]. Similarly, in a large, randomized controlled study, PD participants ($n=195$) were randomized to usual care versus usual care plus video-based visits with a PD specialist and no between group differences in change in quality of life, caregiver burden, quality of care, or healthcare utilization from baseline to month 12 were identified

Table 1
Current State of Video-Based Visits for PD Care

	Established	In Progress	Needed
Feasibility	✓		
Patient Satisfaction	✓		
Provider Satisfaction		✓	
Validation of			
Motor Examination		✓	
Validation of			✓
Cognitive Examination			✓
Management of		✓	
Advanced Therapies		✓	
Feasibility of	✓		
Psychiatric Care	✓		
Feasibility of	✓		
Rehabilitative	✓		
Therapy Services			
Model for			✓
Interdisciplinary Care			✓

[12]. The lack of improvement in quality of life may have reflected high baseline access to PD specialist care (59–73%) in the tested cohort and reliance on local physicians to implement recommendations.

COVID-19 PROPELLED RAPID CHANGES IN THE TELEMEDICINE PRACTICE LANDSCAPE

While some established telemedicine networks existed pre-COVID (e.g., Ontario Telemedicine Network, U.S. Department of Veterans Affairs), variable rates of internet access, licensure requirements, and reimbursement barriers limited widespread implementation of video-based visits in the care of persons with PD. In the U.S., only 59% of adults ≥ 65 years old have home broadband access; Black and Hispanic/Latino individuals and those with lower education levels, lower income levels, and rural residence are less likely to have access [26]. Pre-COVID, Medicare, which insures roughly 60 million Americans over age 65 [27], did not reimburse for in-home video-based visits for persons with PD [28] and only approximately 40% of states allowed for Medicaid reimbursement for in-home video-based visits [29]. The COVID-19 pandemic has forced the rapid adoption of video-based visits [30] and exponential growth of publications ($n = 59$ posted on PubMed in 2020). Telemedicine visits in March of 2020 surged 50% and Medicare primary care video-based visits increased from 1% in February to nearly 50% in April 2020 [31, 32]. Spurred by necessity, changes in policy, infrastructure, technology, and social opinion have resulted in broad changes in the telemedicine practice landscape [33]. The International Parkinson and Movement Disorders Society (MDS) Telemedicine Study Group highlighted the need for ongoing updates of telemedicine guidelines and regulatory policies worldwide and has developed a practical guide for telemedicine visits [34, 35].

Policy changes

This section focuses on the U.S.-based experience as country policies vary widely. U.S. governmental regulations and payer-driven reimbursement policies were expeditiously modified. Congress allocated \$500 million to support telemedicine services; Department of Health and Human Services (HHS) and Centers for Medicare and Medicaid Services (CMS) eased restrictions on telemedicine and revised

reimbursement policies [36]. Medicare changes included expansion of service coverage and removal of licensing barriers. Specific changes included the addition of coverage for 1) new patient video-based visits (eliminating the requirement for a pre-existing relationship), 2) in-home video-based visits, and 3) other services, including psychiatry and rehabilitative therapies. In addition, Medicare waived the previous requirement that the clinician must be licensed in the same state as the patient's residence. With parity in Current Procedural Terminology codes, payments for video-based visits now match those for face-to-face visits [37]. HHS enabled Health Insurance Portability and Accountability Act (HIPAA) flexibility with respect to platform use, allowing providers to use readily available applications, such as Skype, Microsoft Teams, Doximity, and Zoom, as long as they are not public-facing (i.e., Facebook Live) [38].

Infrastructure changes

In response to loosened governmental policy regulations, infrastructure for telemedicine has been expeditiously implemented and augmented across healthcare systems. This has required a rapid scale-up of information technology (IT) infrastructure, including on-boarding platforms, troubleshooting platforms and in-servicing providers. New York University's ability to implement a robust IT framework was integral to their swift development of a virtual neurology program [39].

Increased investment in telemedicine services has supported the immense growth in telemedicine. Telemedicine service companies have seen a 175% increase in customers [40]. There are now 45 prominent healthcare-specific virtual platforms, including Zoom for Healthcare and Doximity Dialer Video [41]. Many vendors are adapting to healthcare's specific needs, such as through HIPAA business associate agreements [42, 43]. The U.S. telehealth market is projected to experience a year-over-year increase of 64.3% in 2020, and seven-fold growth by 2025 [44].

In parallel, there has been an increase in patient and community interest in telehealth. In a survey of 1,800 adults, 55% were willing to use video-based visits to see new doctors, and 83% said they would likely continue to use telemedicine after the pandemic [45]. The percentage of US consumers replacing in-person visits with video-based visits has increased from 11% in 2019 to 46% [37]. Web-based resources, including webinars, virtual exercise classes and support groups,

reflects growing patient and community familiarity and comfort with video-based technology [46].

WORLDWIDE TELEMEDICINE EXPERIENCE

Considering that telemedicine is highly dependent on the availability of technology and country-specific policies, adoption of telemedicine care delivery has been very variable across the globe. Regarding the care of advanced PD in the setting of COVID-19, Fasano et al reported international clinicians' overall lack of preparedness to deliver virtual care and limited telemedicine platforms [47]. The authors highlighted the need for rapid adoption of remote care delivery models and expanded use of digital technology for remote patient monitoring, while providing algorithms to remotely care for deep brain stimulation, levodopa/ carbidopa intestinal gel infusions and other advanced therapies. Similarly, the Digital Technologies, Web and Social Media Study Group of the Italian Society of Neurology published a review of remote PD care delivery in the setting of COVID-19 pandemic that includes a battery of tests for telemedicine visits, patient reported outcomes and smartphone applications [48]. Additionally, the MDS Telemedicine Study Group developed a practical guide on how to implement telemedicine visits, though it does not address regional policies and technology limitations [35].

FUTURE DIRECTIONS

Action needs to be taken to ensure that the immense strides in adopting telemedicine for neurologic care during the COVID-19 pandemic are sustainable, and to improve access to care and quality of care (Fig. 1).

Sustainable and equitable access

Policy changes, including reimbursement parity and relaxation of licensing requirements, need to be maintained through governmental advocacy; the American Academy of Neurology (AAN) is leading this effort on behalf of the neurology community [49]. A concerted effort is needed to ensure equitable access to telemedicine for underserved, rural, and nursing home communities. Special emphasis should be made on access to care in underdeveloped countries. As telemedicine expands, the "digital divide" driven largely by socioeconomic determinants of health, persists [50]. In a cross-sectional study, individuals living in a neighborhood of lower socioeconomic status were significantly less likely to choose a video-based primary care visit (RRR 0.93; 95% CI, 0.89–0.97) compared to those living in a neighborhood with higher socio-economic status. Similarly, individuals with a non-English language preference were significantly less likely to choose a video-based visit compared to those with an English language preference [51]. Thus, there is concern that

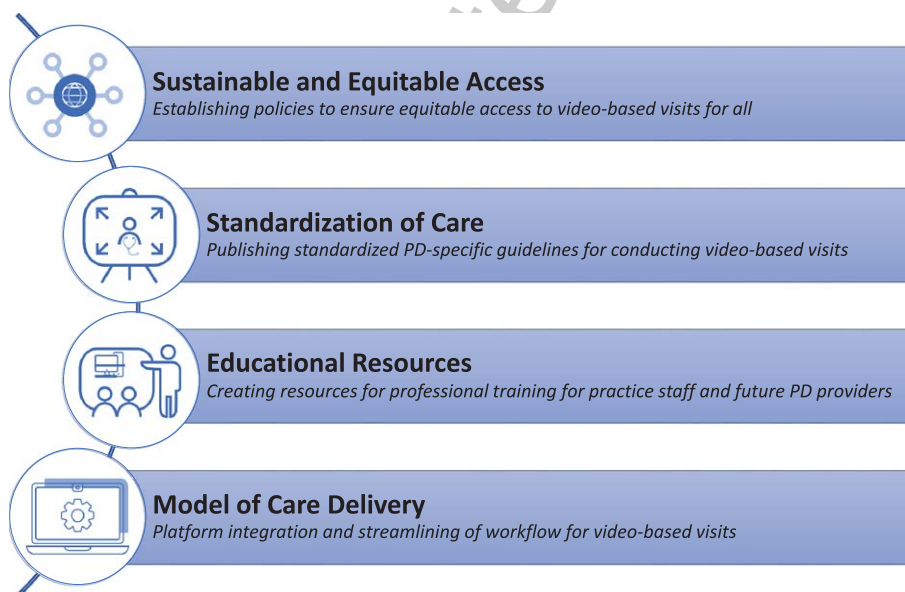


Fig. 1. Future Directions for Video-Based Visits for PD Care.

pre-existing disparities in access to neurologist care for persons with PD could widen in a primary video-based-visit model of care as long as these inequities persist [4]. Policies must be written, and funding allocated accordingly, to address these disparities before the digital divide widens, and the gap in PD care along with it. Telemedicine affords tremendous opportunity for cross-country care delivery – specifically for underdeveloped countries - provided the technology is available.

Standardization of care

Professional organizations, including the AAN, are introducing care guidelines, from conducting a neurologic examination to billing and coding practices [52]. While MDS has created a “step-by-step” guide for telemedicine practice, it does not cover regional differences and regulations [53]. Next steps should include the development of standardized guidelines for PD-specific virtual examination techniques. Validation of the modified MDS-UPDRS motor examination would help to enable uniformity of PD care delivery. A standardized method of video-based interdisciplinary PD care delivery incorporating, for example, social work, nutrition, and nursing, could augment care and potentially “out-perform” in-person visits by providing increased access to ancillary services in the home environment.

Educational resources

Resources for professional training need to extend to practice staff and future providers. Recognizing this need, the AAN Telemedicine Work Group published the first model framework for a teleneurology curriculum for neurology residents in 2017 [54]. This occurred in parallel with a pilot outpatient teleneurology resident curriculum at the University of California San Francisco, which improved resident knowledge and competence in using telemedicine in future practice [55].

Model of care delivery

As telemedicine platforms are integrated into clinical practices, healthcare systems will need to streamline the workflow of virtual encounters, from accurate medication reconciliation to scheduling follow-up appointments. Integration of the telemedicine platform into the electronic medical record can simplify visits and reduce administrative

burden, particularly in the delivery of interdisciplinary care. Providing instructions to patients in advance is also integral to ensuring efficiency and satisfaction.

CONCLUSIONS

Video-based visits uniquely provide what has been aptly described as “the four C’s” for PD patients: care, convenience, comfort, and confidentiality [56]. The COVID-19 pandemic has added a 5th C, contagion, which accelerated the adoption of video-based visits through changes in policy and regulation, precipitous advancement of technology and infrastructure, increased patient interest, and greater acceptance of this novel care model. We must now deliver on the promise of video-based visits to improve access to, and further enhance the quality of PD care. Advocating for continued policy changes and equitable access, as well as establishing best practices for video-based care, must be a top priority for PD providers and health systems world-wide. Telemedicine offers a unique opportunity to propel PD patient care into the 21st century with a novel philosophy and platform of patient-centric care delivery. However, achieving this ambitious but realistic goal will require ongoing collaborative efforts between the international movement disorders community, policy makers, and patients, extending beyond the COVID-19 crisis.

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CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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