

Global Survey on Telemedicine Utilization for Movement Disorders During the COVID-19 Pandemic

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ABSTRACT: Background: The COVID-19 pandemic restricted usual healthcare management for movement-disorders patients, with a consequent upsurge in telemedicine to bridge the gap.

Objective: To assess global telemedicine usage in the context of the pandemic.

Methods: The Movement Disorder Society (MDS) Telemedicine Study Group surveyed telemedicine experts from 40 countries across all continents in March–April 2020. Four domains of telemedicine were assessed: legal regulations, reimbursement, clinical use, and barriers; comparing emerging responses to the pandemic versus the baseline scenario.

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Members of the Movement Disorder Telemedicine Study Group are listed in the Appendix.

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Results: All forms of telemedicine for movement disorders increased globally, irrespective of country income categorization, as an immediate response to the pandemic. This was aided by widespread availability of technology and updated government regulations. However, privacy concerns, lack of reimbursement, limited access, and lack of telemedicine training were barriers highlighted worldwide.

Conclusions: Questions remain about the longevity and extent of changes in regulations and reimbursement regarding telemedicine in the aftermath of the pandemic. © 2020 International Parkinson and Movement Disorder Society

Key Words: coronavirus; telehealth; technology; legislation; reimbursement; license

Introduction

COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. (<https://www.who.int/news-room/detail/27-04-2020-who-timeline-covid-19>) This declaration triggered almost immediate global restrictions to routine healthcare access, principally to limit viral transmission, but also to prioritize healthcare resources to address the novel virus. These restraints threatened continuity of care for patients with chronic medical conditions, including Parkinson's disease and other movement disorders.^{1,2} Escalation of telemedicine presented an obvious alternative to bridge the gap without considerably compromising the quality of medical care.³

Existing data on global telemedicine use for movement disorders was first collected in 2015 via a survey of members of the International Parkinson and Movement Disorder Society (MDS).⁴ Of over 500 survey respondents from 83 countries, approximately half were engaged in telemedicine for movement disorders, despite barriers such as lack of reimbursement and technological difficulties. Half of respondents planned to use telemedicine in the future, and three-quarters desired telemedicine education.

The Telemedicine Study Group within the MDS therefore aimed to conduct an updated assessment of global telemedicine use for movement disorders. In particular, the objective was to assess telemedicine usage and its associated barriers and legislation, just prior to the COVID-19 pandemic and in the face of the emerging pandemic.

Methods

The study was designed and conducted by the Telemedicine Study Group of the MDS. We utilized a structured electronic survey, with the target respondents

TABLE 1. Legal regulations, reimbursement and institutional guidelines, telemedicine modalities and software, and barriers for telemedicine, amongst 40 countries just prior to the COVID-19 pandemic

	Legal regulations?	Reimbursement? Institutional guidelines?	Telemedicine modalities and software	Barriers
Europe				
Ireland, UK	No	No, although patients might have private healthcare insurance	Phone calls	Potential capabilities to use other platforms but hindered by lack of experience by patient/carers.
Italy	Yes	Video-consultation (eg. Besta Institute in Milan) reimbursed by Regional Health Service		Lack of patient training, lack of familiarity with technology. Request written informed consent prior to video-consultation.
Israel	Yes. Local care requires Israeli license. With global private professional insurance coverage can provide care to most countries.	Yes, in general. Each HMO and insurance has different plans and reimbursement policy.	For telemedicine clinics: Video conferencing, Zoom, email (Foxit). During the pandemic, HMOs without telemedicine infrastructure used phone calls or WhatsApp.	Reimbursement issues. Large populations without smartphone access. Unrealistic expectations for operative and medical solutions.
Netherlands	No	Fully reimbursed	Phone calls. Zaurus for videoconferencing	Potential capabilities to use other platforms but hindered by lack of experience and knowledge by patient/carers. Privacy concerns. Only Zaurus is integrated on Epic
Spain	No	No, although patients might have private healthcare insurance	Phone calls. WhatsApp, Skype Professional	Potential capabilities to use other platforms but hindered by lack of experience by patient/carers.
Pan-America				
Argentina	No	Yes. Some private companies provide specific reimbursement	Phone calls, emails, video visits, Skype, WhatsApp, Zoom, Doctor teleconsultation, Hangouts, specific hospital telemedicine platform	Lack of experience for patient/carers, technical limitations
Canada	Yes. Any licensed physician can perform telemedicine visits. Some variations by province.	Yes. Generally well reimbursed in all provinces, except for Nova Scotia, for video visits and telephone visits.	Patients go to a telemedicine studio that has an experienced coordinator present in Alberta, Manitoba and Ontario. In Ontario, required to use Ontario Telemedicine Network systems platform. In Quebec, telephone or 3 telemedicine software options are allowed (REACTS which is integrated into EMR; Zoom, Microsoft Team).	Barriers vary by province. No major barriers, except for elderly patients using technology reported in Ontario and Quebec. Limited access, time, and poor reimbursement in Nova Scotia.
Chile	Yes	Yes	Video visits; teladoc	Technical limitation
Colombia	Yes	Yes	Phone calls, video visits, Cisco, Microsoft teams	Technical limitation, patient reluctance
Cuba	No	No	Phone calls, video visits. WhatsApp	Technology access and cost.
Dominican Republic	Unknown	No	Text messages	Technical limitations, lack of training
El Salvador	No	Yes	Video visits. Doxy.me	Lack of training
Guatemala	No	It may or may not be reimbursed.	Video visits, phone calls	Patient reluctance, privacy concerns
Honduras	No	No	Text messages	Technical limitations
Mexico	Yes	Yes	Video visits, Webex	Patient reluctance
Paraguay	Unknown	Yes	Video visits, WhatsApp	Technical limitation
Peru	Yes	No	Emails	Technical limitation

(Continues)

TABLE 1. Continued

	Legal regulations?	Reimbursement? Institutional guidelines?	Telemedicine modalities and software	Barriers
Puerto Rico	Yes. Certification that includes specific requirements and payment of a fee.	Limited, with poor reimbursement	Emails, phone calls	Technical limitations, lack of training, patient reluctance, limited internet access, poor reimbursement, cost
Uruguay	No	No	Phone calls, email, WhatsApp, but not regularly used. A few private healthcare services use other platforms.	Privacy concerns, lack of training, technical limitations.
USA	Yes. Varies by state	Yes, varies by state	Video visits, phone calls, emails, asynchronous consults	Reimbursement, technological issues, patient/health worker lack of training
Asia-Oceania				
Australia	Yes. National regulations. Medical indemnity recommends recording patient consent, potential confidentiality breach, and inability to fully examine the patient. https://www.medicalboard.gov.au/Codes-Guidelines-Policies/Technology-based-consultation-guidelines.aspx ; http://www.ehealth.acrrm.org.au/telehealth-standards ; https://www.racpotelehealth.com.au/guidelines/ ; https://www.racp.edu.au/fellows/resources/rural-health-continuing-education-program/telehealth-technology-workshops/telehealth-for-patient-care	Yes, reimbursement laws. Government rebate funding restricted to rural/ remote patients and nursing home residents, and matched face-to-face consults. Medicare requires specific conditions based on patient service and location (fee for service). For remote patients, the Medicare rebate is higher. For metropolitan area patients, bulk-billing for private or public services. Reimbursement does not cover the cost of the service, but patients in public service do not pay out of pocket. Moving from fee for service reimbursement to activity based funding. Unable to bill in private practice for phone consultations, and most doctors consult with video. No preference for time split.	Phone calls, video conferences, emails, or GP telecare involvement for complex care. Mostly used for remote or nursing home patients. NSW: My virtual care, e-health, PEXIP, approved by NSW health and academy of clinical innovation. VIC: Public system uses a proprietary platform produced for state government hospitals. For videoconference in private practice (Skype, Zoom)	Technology (patient and health care worker), limited examination; and start-up operational issues, privacy/ safety issues, patient lack technology or telemedicine training. However, almost all patients have a phone (also back up for video).
China	Yes. Telemedicine only allowed in "Internet Hospital", specifically approved for telemedicine		WeChat with text message and videoconference	Inadequate insurance coverage, limited number of "Internet Hospitals"
Japan	No. However telemedicine is used in compliance with laws and guidelines (Medical Practitioners' Act, Medical Care Law, Act on the Protection of Personal Information, and Security Guidelines for Medical Information Systems). Telemedicine was first recognized in 1997 by the Health Policy Bureau Director of the Ministry of Health and Welfare. National Telemedicine Guidelines were issued by the Ministry of Health, Labor and Welfare in 2018.	Yes. Since 2018, telemedicine is included in the universal insurance system. Under this system patients pay up to 30% of medical fees and the remainder 70% is paid by insurance. Medical institutions providing telemedicine can charge insurers up to 700 JPY/month. Medical institutions receive payment for medical services, called a 'national fee schedule' for permitted medical practices. Most Japanese hospitals still recommend office visits, but more clinics have adopted telemedicine.	One hospital in Tokyo (Juntendo University Hospital) uses telemedicine since 2017. The device is an iPad.	Cost of devices. Patients have a monthly contract with IBM (corroborating company) for iPad and app. Limited examination, privacy concerns, patients lack devices.

(Continues)

TABLE 1. Continued

	Legal regulations?	Reimbursement? Institutional guidelines?	Telemedicine modalities and software	Barriers
New Zealand	No. (However regulations for established stroke telemedicine)	Yes, reimbursement is provided. Mainly public-funding and salaried. Similar for private clinics. No specific guidelines and neurologists decide on case-by-case basis whether patient requires an office or virtual visit. The general principal is that it needs to be time-critical and moderate risk of harm to the patient.	Combination of phone calls, emails, text messages, videoconferences. For Telestroke- Polycam. For consults- phone calls, Zoom, Facetime, WhatsApp.	Reduced quality of communication/exam, limited internet quality in some areas, privacy concerns (avoid by emailing patient from centralized work address), lack of training, challenging for older generation physicians using paper-based system.
Pakistan	No	No	Personal email, cell phone or personal WhatsApp. Mostly used for remote care.	Lack of reimbursement results in reduced uptake
Saudi Arabia	Yes. Telemedicine Unit of Excellence (STUE) governs telemedicine malpractice insurance. Physicians need to have a license. Telemedicine covered by malpractice insurance.	No	App (Seha). Phone calls, video calls (in tertiary centers).	Cultural reasons, technical limitations, difficulty communicating with demented or elderly patients.
Singapore	Yes. National Telemedicine Guidelines issued by Ministry of Health in 2015. Since 2018, the National Neuroscience Institute implemented PDPA (Personal Data Protection Act) which is wide ranging with significant punishments (jail, hefty fines) for violators, which made research very difficult for using existing patient databases if prior consent has not been obtained.	No	Telephone and asynchronous consults via emails and text messaging have been in use since at least 2015 in 1 institution. Zoom accounts secured through a contract with the national telecommunications provider to ensure PDPA (data privacy standards).	Slow bandwidth, older population that should benefit most from telemedicine have technology limitations.
South Korea	Illegal as of April 2020. Only telemedicine for research used with approval.	No	Phone calls.	Lack of training for patients, caregivers, and doctors. Lack of visual input with phone calls.
Taiwan	Yes. Ministry of Health and Welfare determined rules for diagnosis and treatment by telecommunications.	Yes. Covered by National Health Insurance System if telemedicine conducted under the regulations of the rules. Innovative models: model testing payments for telemedicine in rural areas such as Integrated Health Care Delivery System. A Telehealth Center in the National Taiwan University Hospital uses five different cash payment methods based on different instrument combinations used.	The modalities and software used depend on patient and medical team convenience.	Technological and internet limitations, especially in geriatric patients and rural areas. Some interactions by face to face communication cannot be achieved by telemedicine.
Thailand	Yes. Legal regulations and requires patient consent.	No fee-for-service in government hospital. Recommend video and in-office visits alternate to extend travel time.	Phone call first and then video call with Zoom or 'LINE' (messenger app similar to WhatsApp).	Lack of training for staff, elderly patients with technology limitations, performing medication changes.
Africa Cameroon	No	No	Phone calls, emails, Skype, WhatsApp, other teleconferences	Lack of training, lack of motivation of doctors

(Continues)

TABLE 1. Continued

	Legal regulations?	Reimbursement? Institutional guidelines?	Telemedicine modalities and software	Barriers
Egypt	No	Private sector pay similar to physical visits	Phone calls, WhatsApp, Zoom, Facebook	Patient lack of interest and awareness, technical difficulties (internet connections, training).
Ethiopia	Yes.	Not reimbursed. Each Hospital/College has a department that oversees the telemedicine service. Healthcare providers can use department computers for free, but pay technical personnel.	Telemedicine teaching program with patient consent.	Lack of infrastructure for telemedicine, lack of dedicated telemedicine room, lack of sustainable internet service.
Ghana	No	No	Phone calls, consult with colleagues for radiology and investigations. WhatsApp	Quality of internet access, privacy/confidentiality, time constraints.
Morocco	No	Yes. Private clinics are reimbursed for telemedicine visits, but not government.	Phone calls, video visits, sending radiology and laboratory results via photos. WhatsApp	Technological limitations, specifically absence of a national telemedicine platform for public services
Nigeria	No	Yes. Individual private practitioners may charge a fee per consultation, although there is no recommendation provided by government institutions.	Phone calls, text (sms) messages, messaging apps (eg, WhatsApp), video conferences, video chat.	Limited technology capacity within hospitals, that is, internet bandwidth, lack of telemedicine infrastructure (computers with encrypted internet/intranet capacity and restricted access); lack of EMR or video-visit function, cost of data for phones or WhatsApp video calls. Lack of EMR-enabled prescriptions (some pharmacies will not sell medications without a prescription, and few pharmacies offer delivery). Low political will to drive and sustain a telemedicine hospital policy. From the patient perspective, limited access to technology (smart phones, tablets), poor internet connectivity in remote areas. Lack of confidence with virtual visits, prohibitive cost of data, limited bandwidth in some areas.
South Africa	No. However recent recommendations from indemnity insurers (MPS, Health Professions Council)	Yes. Private sector has codes for telephone consults that are reimbursed by medical insurance companies according to their own rules. There are no codes for other forms of telemedicine.	Mostly phone consults, occasional video visits. Skype phone calls, emails, text messages	Consent and identification of patients. Mostly used for established patients for basic follow up (medication, basic DBS adjustments with patient controller at home)
Tanzania	Yes	No	Video conferences to peripheral/remote hospitals. WhatsApp, text messages.	Patient confidentiality, internet availability in remote areas or phones with WhatsApp. Lack of training and materials for video conferencing.
Tunisia	Yes	Yes. Private practitioners charge fees per consultation	Emails, text messages, video conferences. Platforms offered by private companies are used by private practitioners only.	Technological limitations
Zambia	Yes. Legal regulations in the main tertiary hospital in Lusaka.	No	Phone calls, emails, teleconferences, tele-education with international lectures. Skype, WhatsApp	Lack of organization, lack of training, lack of motivation of doctors

EMT, electronic medical records; HMO, Health maintenance organization.

TABLE 2. Changes in telemedicine use immediately following the COVID-19 pandemic announcement amongst 40 countries

	Increase in telemedicine?	Telemedicine used	Changes in legislation, reimbursement or barriers
Europe			
Ireland, UK	Yes	Phone calls, video consultations.	Changes to national policy on telemedicine were required to meet demand and infrastructural limitations.
Israel	Yes	Video conferencing (Zoom) + email (foxit).	Need for training with technology and televisits.
Italy	Yes. New uptake in some institutions.	Video-consultation using Microsoft TEAMS.	Recommended switch from office to video-consults, although outpatient visits continued if required. Gabbriellini F, Bertinato L, De Filippis G, Bonomini M, Cipolla M. Istituto Superiore di Sanità. Interim provisions on telemedicine healthcare services during COVID-19 health emergency. Version of April 13, 2020. 2020, ii, 29 p. Rapporti ISS COVID-19 n. 12/2020
Netherlands	Yes	Phone calls. Zaurus for videoconferencing	Follow-up appointments by phone.
Spain	Yes	Phone calls. WhatsApp, Skype Professional.	Follow-up appointments by phone.
Pan-America			
Argentina	Yes	Video visits, email	Telemedicine increased or started for the first time in some locations. However some institutions do not endorse it, and lack of reimbursement for email or phone visits.
Canada	Yes. It increased in some provinces, but decreased in others	Telephone calls, video visits, email. In Ontario and Alberta, telemedicine centers shut down to limit direct patient contact, and switched to phone calls instead. Zoom and other platforms.	Telemedicine decreased in Ontario and Alberta, as telemedicine centers were closed down, until relaxation of legislation to allow other software platforms and telemedicine could continue. There was improvement in reimbursement (Nova Scotia) and an enhanced COVID-19 telemedicine fee (Ontario).
Chile	Yes	Video visits	Increased regulation. Many office visits converted to video visits, and reimbursed at the same rate. High patient satisfaction, physician protection from infection risk while teleworking.
Colombia	Yes	Video visits	No changes
Cuba	Yes	Increase in phone calls, video visits and WhatsApp	No changes
Dominican Republic	No	Text messages	No changes
El Salvador	Yes	Video visits	There are new proposals in government to develop and regulate the use of telemedicine.
Guatemala	Yes	Video visits	No changes
Honduras	Yes	Increased video visits	
Mexico	Yes	Video visits	
Paraguay	Yes	Video visits	
Peru	Yes	Phone calls	Regulation of telemedicine has increased during the pandemic.

(Continues)

TABLE 2. Continued

	Increase in telemedicine?	Telemedicine used	Changes in legislation, reimbursement or barriers
Puerto Rico	Limited	Video visits, email, phone calls	No change to barriers, and thus many neurologists closed their practices further restricting healthcare access for patients. However telemedicine can now be conducted without certification or training. Insurance companies reimburse telemedicine visits equivalent to office visits.
Uruguay	Yes	90% of consults are done by phone calls.	The crisis changed acceptance from patients. A new law was recently passed to regulate and increase telemedicine development.
USA	Yes	Increase in phone calls, video visits. Zoom and multiple other platforms.	Looser restrictions. Telemedicine for new patients and phone call visits allowed, and reimbursed similar to office visits by Medicare and private insurers.
Asia-Oceania Australia	Yes. Transition to >90% telehealth for outpatient services. All modes increased- phone, teleconference and video conferencing.	Phone calls, video conferences, nurse/patient emails. NSW: My virtual care, e-health, PEXIP approved by NSW health and academy of clinical innovation. Victoria: public system uses a proprietary platform produced for state government hospitals. For private practice (Skype, Zoom).	New billing codes (item numbers) introduced by the government specifically for COVID crisis. Allows teleconference for all appointments if patients or doctor met certain high risk criteria. They are expanding to all consultations, but must be bulk billed, although this was being reviewed as sudden decline in income was prohibitive to some practices. https://www.health.gov.au/resources/publications/covid-19-national-health-plan-primary-care-package-mbs-telehealth-services-and-increased-practice-incentive-payments
China	Yes	Phone calls	Rules temporarily changed. Innovative suggestions, for example, request IBM to allow free use of web-based app. Telephone is allowed to be used for telemedicine in Tokyo, Fukuoka and other areas. Japanese government reimburses telemedicine by insurance but this is insufficient.
Japan	Yes (in selected regions)	Video visits	No formal guidelines, regulations or changes in payment structures to date, although this may change. Currently getting patients seen is taking priority over strict confidentiality rules.
New Zealand	Yes	Phone calls, emails, text messages, videoconferences. For Telestroke - Polycom. For consultations - calls, Zoom, Facetime, WhatsApp.	
Pakistan	Yes	Personal email, cell phone and WhatsApp. Mostly used for remote care. https://doctors247.online/	No changes.
Saudi Arabia	Yes	App (Seha). Phone calls. Virtual clinics.	Strict criteria for example, only follow-up patients, no first visits. Reduced bureaucratic red tape. The Ministry of Health prepared a 2-hour e-learning module on telemedicine. The National Telemedicine Guidelines are currently being revised. Chronic disease management program (CDMP) guidelines followed for patients with chronic conditions seen
Singapore	Yes.	Video consults	

(Continues)

TABLE 2. Continued

	Increase in telemedicine?	Telemedicine used	Changes in legislation, reimbursement or barriers over video.
South Korea	Yes. Illegal before COVID-19, but now temporarily allowed.	Phone calls	Patients pay the same as face-to-face consult and are entitled to means-tested subsidies. They are unable to use government insurance/ health policy scheme (3 Ms), as neurological conditions are not included listed for government exception.
Taiwan	Yes.	Platform or software depends on patient choice.	The Korean government temporarily allowed telemedicine only for established patients. Regulations were expanded to use telemedicine for home quarantine and stable chronically ill patients. Patients prefer not to come to the hospital.
Thailand	Yes. Telemedicine used for home quarantine patients.	Virtual teleclinics (PD, hyperkinetic disorders, DBS, gait clinic). Teleconference and teleconsults minimize patients coming to hospital.	
Africa			
Cameroon	Yes	Phone calls, emails, skype, WhatsApp, other teleconferences for lectures	No changes.
Egypt	Yes	Phone calls, WhatsApp, Zoom, Facebook.	Some government-owned hospitals and several private clinics now have dedicated phone numbers posted on hospital websites and social media pages to enable existing and new patients to contact physicians, schedule appointments and review concerns electronically. At least one state has launched a 24-hour remote visit service for residents via voice or video call using a toll-free line in English and 3 major local languages (for primary care consultations). Several free platforms run by non-governmental providers enable virtual access to link potential patients to specialists (requires pre-registration and a fee for service). Private hospitals enable paid access through various platforms (telephone, Zoom, WhatsApp, and other video conferencing apps). Guidelines on ethics and medicolegal issues have become available.
Ethiopia	Yes	Zoom Teleconferences for weekly seminars and case discussion.	
Ghana	Yes	WhatsApp.	
Morocco	Yes	WhatsApp for patient follow-up visits.	
Nigeria	Yes	Phone, video visits.	
South Africa	Yes	Telephone or video visits for follow up consults.	
Tanzania	Yes	WhatsApp, text messages.	
Tunisia	Yes	Video visits and videoconferences through a private platform.	
Zambia	Yes	Phone calls, emails, skype, WhatsApp, other teleconferences for lectures.	

being members of the Telemedicine Study Group and other active MDS telemedicine experts, to ensure international coverage across the MDS sections (Europe, Pan-America, Asia-Oceania, and Africa). Survey questions were developed via a consensus approach to query four domains of telemedicine: legal regulations, reimbursement and clinical regulations, clinical usage/telemedicine tools, and barriers within that country or region. The survey was completed via email between March and April 2020. The respondents were asked which of these domains had changed in response to the COVID-19 pandemic.

The questions asked were:

1. Do you have legal regulations regarding telemedicine practice in your hospital/region/country?
2. Is there reimbursement for telemedicine services? Are there rules regarding office visits versus telemedicine visits?
3. What methods of telemedicine do you use (eg, telephone calls, emails, text messages, and videoconferences) and any specific software?
4. What are the main barriers to telemedicine (eg, technological limitations, patient rejection, lack of training, and privacy concerns)?
5. With the COVID-19 pandemic, are neurologists/movement disorder specialists in your country/region using more telemedicine? Has this crisis changed anything in questions 1–4?

Responses were thematically summarized within the four domains to enable comparison.

Results

Data was obtained from 40 countries within the MDS regional sections: Europe (Ireland, Israel, Italy, Netherlands, and Spain), Pan-America (Argentina, Canada, Chile, Colombia, Cuba, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, Puerto Rico, Uruguay, and USA), Asia-Oceania (Australia, China, Japan, New Zealand, Pakistan, Saudi Arabia, Singapore, South Korea, Taiwan, and Thailand), and Africa (Cameroon, Egypt, Ethiopia, Ghana, Morocco, Nigeria, South Africa, Tanzania, Tunisia, and Zambia).

Baseline Usage of Telemedicine Before the COVID-19 Pandemic

Prior to the COVID-19 pandemic, there were no specific regulations governing telemedicine use in the surveyed countries in Europe and Africa, except for Zambia and Tunisia (Table 1). This was in contrast with many countries in Pan-America and Asia-Oceania where there was tight regulation of telemedicine. These

regulations ranged across a spectrum to facilitate or prevent telemedicine. For example, several Canadian provinces reported a sophisticated telemedicine infrastructure with dedicated telemedicine centers, personnel and reimbursement, in contrast with South Korea where telemedicine was illegal for clinical care. Reimbursement varied considerably between countries, and also varied within the same country, depending on the health care setting utilized (public or private). The most common response was no reimbursement, particularly if no billing code. In many countries, it was available as fee-for-service and partially or fully covered by insurance. Telemedicine modalities included emails, telephone calls, message apps, video visits, and teleconferencing. These types of tele-healthcare were similar across both low- and high-income countries. Barriers to telemedicine were alike worldwide, including technologic issues, lack of reimbursement, privacy issues, and lack of familiarity by both patients and physicians. In some countries, broadband data charges or cost of devices was a significant limitation for patients and physicians to conduct telemedicine visits.

Change in Usage of Telemedicine After COVID-19 Pandemic

In response to the COVID-19 pandemic, telemedicine usage increased across almost all of the surveyed countries, including those with little to no prior usage (Table 2). Telephone calls, messaging apps, or video visits replaced or supplemented outpatient clinics. In South Korea, the illegal status was lifted to follow established patients through telemedicine. In Canada, legislative changes varied significantly depending on the province: established telemedicine centers shut down to limit viral transmission and transitioned to telephone calls instead, paradoxically resulting in a reduction in telemedicine, whereas other provinces increased telemedicine because of new reimbursement and looser regulations. Governments from several countries initiated legislation to promote and regulate telemedicine and/or amended their prior restrictive regulations. Privacy issues and technical limitations mostly remained unchanged. However a number of selected countries across all MDS sections reported improved reimbursement.

Discussion

This survey demonstrates the vast global increase in utilization of all forms of telemedicine for movement disorders consultations across countries, irrespective of income categorization, as an immediate response to the COVID-19 pandemic. This uptake appears to have been facilitated by a combination of urgent governmental responses (ie, modifying regulations and initiating telemedicine legislation) and pre-existing global availability of technology (ie, smart devices and internet

connectivity). However, privacy concerns, lack of reimbursement, technical and technologic issues, and lack of training in use of telemedicine for virtual visits were issues highlighted worldwide.

In contrast to the baseline survey in 2015, where about half of the respondents personally used telemedicine,⁴ we pre-selected respondents who were more likely to be well-informed and engaged in telemedicine for movement disorders. This was to ensure that the data obtained regarding the work-place and in-country standards (regulations, reimbursement, modalities, and barriers) would be trustworthy, both pre-COVID-19 and in the face of the emerging pandemic. Importantly, their responses highlight several key points.

First, the barriers to telemedicine identified in 2015 largely remained unaddressed in early 2020 and even during the COVID-19 pandemic. This is despite all stakeholders, that is patients, physicians, and government, now relying on this service for healthcare delivery. Second, despite these barriers, telemedicine use for movement disorders increased amongst countries and physicians that already used it, as well as those with limited to no prior use. Although necessity for sustaining healthcare access probably drove this increase of telemedicine, the barriers that remain are likely burdening both physicians and patients. Third, the increased uptake of telemedicine in many countries seemed to be uneven, whereby a subgroup of patients or healthcare providers are better positioned to engage with it. For example, elderly persons or those unfamiliar with telemedicine, restricted internet connectivity (remote locations, unaffordable data or device costs), and lack of physician reimbursement were major limitations to using telemedicine for movement disorders. The implication is that existing disparities in access to healthcare may potentially be increased if these barriers remain unexplored and unaddressed. Fourth, a small number of countries reported rapid and substantial government relaxation of regulations, demonstrating that bureaucratic changes are feasible, even where previously very stringently controlled. Last, even a sophisticated telemedicine infrastructure may have a weak link exposed by the pandemic, rendering it ineffective as was evidenced in Canada.

The findings from this survey flag opportunities for improvements that can transform telemedicine for movement disorders to a more user-friendly and satisfactory experience. For instance, the MDS Telemedicine Study Group created a “step-by-step” webinar to conduct a telemedicine visit for movement disorders clinicians worldwide, publicly available, and posted on the Movement Disorders Society website ([https://www.movementdisorders.org/MDS/About/Committees-Other-Groups/Telemedicine-in-Your-Movement-Disorders-](https://www.movementdisorders.org/MDS/About/Committees-Other-Groups/Telemedicine-in-Your-Movement-Disorders-Practice-A-Step-by-Step-Guide.htm)

[Practice-A-Step-by-Step-Guide.htm](https://www.movementdisorders.org/MDS/About/Committees-Other-Groups/Telemedicine-in-Your-Movement-Disorders-Practice-A-Step-by-Step-Guide.htm)). In addition, a patient brochure “Preparing for a Telemedicine Visit” has been created and will be available in English, and translated to several other languages (under publication). Addressing the common issues related to telemedicine utilization across the various world regions would take concerted efforts and advocacy. The need for accessible telemedicine services, globally demonstrated during this pandemic, should be the impetus for operationalizing the existing WHO recommendations, and adopting concrete and practical steps to implement strategies that will address the social, cultural, economic, technical, legal, and legislative barriers to telemedicine development and uses. (WHO. Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009. [Global Observatory for eHealth Series, 2] Available at https://www.who.int/goe/publications/goe_telemedicine_2010.pdf.) This is important for the future, where telemedicine may continue to be necessary to overcome infectious or other public health disasters/pandemics, and a healthcare response can be mobilized in a short period of time.

We acknowledge the limitations to this survey, as only 40 countries are captured, despite COVID-19 being recorded in almost all countries in the world (<https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/world-map.html>). Moreover, the timing and impact of the pandemic differed between countries, with consequent variations in social restrictions and government responses that likely influenced the degree of telemedicine changes within each country. However, the countries represent a broad spectrum of income categories and were drawn from all world regions represented within the MDS. The responses were obtained from movement disorders specialists with a bias for telemedicine, and their opinions would likely reflect personal experiences. This may, however, have some advantage regarding the accuracy of the information regarding barriers, existing legislation, and observed changes post-COVID-19. The survey’s findings may not be generalizable across other neurological or medical specialties, or for countries not surveyed, and within-country variation may exist. Therefore, endeavors to conduct detailed country-specific surveys of telemedicine before and after COVID-19, and deeper exploration of barriers, would help to provide more granular detail about the findings captured in this study.

The importance of this survey is the insight it provides into the current use of telemedicine across all continents for movement disorders, delivering a truly global view. This data can be used to help address barriers raised by both physicians and patients, and to continue to enhance the experience of telemedicine for all stakeholders. Questions remain about the longevity of

changes in regulations and reimbursement practices as the world moves past the COVID-19 pandemic. ■

Appendix

The Telemedicine Study Group

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