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ORIGINAL ARTICLE

Argentinean consensus recommendations for the use of telemedicine in clinical practice in adult people with multiple sclerosis

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Abstract

Background The use of telemedicine has quickly increased during of the COVID-19 pandemic. Given that unmet needs and barriers to multiple sclerosis (MS) care have been reported, telemedicine has become an interesting option to the care of these patients. The objective of these consensus recommendations was to elaborate a guideline for the management of people with MS using telemedicine in order to contribute to an effective and high-quality healthcare.

Methods A panel of Argentinean neurologist's experts in neuroimmunological diseases and dedicated to the diagnosis, management,and care of MS patients gathered virtually during 2021 and 2022 to conduct a consensus recommendation on the use of telemedicine in clinical practice in adult people with MS. To reach consensus, the methodology of "formal consensus RAND/UCLA Appropriateness method" was used.

Results Recommendations were established based on relevant published evidence and expert opinion focusing on definitions, general characteristics and ethical standards, diagnosis of MS, follow-up (evaluation of disability and relapses of MS), identification and treatment of relapses, and finally disease-modifying treatments using telemedicine.

Conclusion The recommendations of this consensus would provide a useful guide for the proper use of telemedicine for the assessment, follow-up, management, and treatment of people with MS. We suggest the use of these guidelines to all the Argentine neurologists committed to the care of people with MS.

Keywords Multiple sclerosis · Telemedicine · Teleneurology · Diagnosis · Treatment

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Introduction

Telemedicine has an important potential to address some of the challenges faced by different countries worldwide, especially in developing countries, in providing accessible, cost-effective, and high-quality healthcare services [1], thus avoiding unneeded visits to clinicians. Telemedicine can improve patient outcomes by increasing access to care and medical information, enhancing quality through patient monitoring and engagement, and increasing patient experience by providing greater convenience and access [2]. The use of telemedicine has quickly expanded because of the COVID-19 pandemic which kept patients away from medical consulting rooms, especially from specialized centers [3]. In this context, telemedicine has been relevant to patient and clinician safety, and both doctors and large institutions have pivoted their in-person care model to virtual care [3, 4]. Thus, telemedicine provides an emerging model for the assessment and management of several neurological disorders, including multiple sclerosis (MS)[5]. However, prior to the COVID-19 pandemic, telemedicine was already meeting the needs of some patients, including those who were geographically isolated (i.e., both rural and urban areas), with disabling or severe neurological diseases that prevented them to move around or those without access to transportation, among others, but this modality of care has not been widely used when compared to in-person appointments at that time [6]. Before the onset of the COVID-19 pandemic, a retrospective study reported that the neurologists' appointments of outpatients using telemedicine were similar to that of in-person visits [6]. In this line, a prospective study on 36 MS patients reported that 97% of participants would recommend telemedicine visits and 94% of them found it easy to connect via telemedicine [7]. Additionally, MS patients were grateful for the convenience of using telemedicine visits because of their similarity to in-clinic visits [7]. Furthermore, the Telemedicine Work Group of the American Academy of Neurology (AAN; 2019) reported that telemedicine reduced missed workdays by 65%, decreased travel by a median of 258 km, and reduced costs of accommodation by 17% in MS patients [8]. Another study has also reported saving $144 (USD) in travel costs and lost wages when comparing cognitive test sessions conducted via telemedicine vs. in-person [9]. A longitudinal study on 41 MS veterans found that 87.5% of them had good experiences with home telehealth monitors [10]. In this line, one study reported that video appointments were shorter and more focused on specific topics [8, 11]**.** However, AAN consortium has recently published recommendations on implementing distinct types of telemedicine service, highlighting that neurological examination can be feasible remotely, but neurologists should consider some limitations. A prospective study of 36 MS patients found that 97% of participants would recommend telemedicine visits, and 94% of participants rated it easy to connect via telemedicine [7]. Participants in this study provided qualitative comments that expressed appreciation for the convenience of telemedicine visits and similarity to in-clinic visits [7].

The management of MS patients is complex and challenging in clinical practice. Thus, distinct local factors should be considered when recommending how telemedicine should be used. Given that the cost to diagnose, treat, and follow-up MS patients is high, unmet needs and barriers to MS care have been reported [11, 12], and considering that Argentina is a lower-income country where developing health systems are not prepared and designed to properly adopt MS care as part of their budget, telemedicine has become an interesting option to the care of these patients.

The objective of these consensus recommendations was to elaborate consensus guidelines for the management of people with MS using telemedicine in order to contribute to an effective and high-quality healthcare.

Methods

A panel of Argentinean neurologists' experts in neuroimmunological diseases and dedicated to the diagnosis, management, and care of MS patients gathered virtually during 2021 and 2022 to conduct a consensus recommendation on the use of telemedicine in clinical practice in adult patients with MS. To reach consensus, the methodology of "formal consensus RAND/UCLA Appropriateness method" was used [13].

The method for developing practice guidelines by formal consensus is both a consensus method and a guideline method. As a consensus method, the objective is to formalize the degree of agreement among expert neurologists by identifying and selecting, through iterative ratings with feedback, the statements on which experts agree, and those situations on which they disagree or are undecided. The guideline methods are subsequently based on agreement statements. As a practice guideline method, the objective is to draft several concise, unambiguous recommendations that address the questions of interest, thus, providing clinicians and patients with assistance in deciding on the most appropriate care in given clinical scenarios. RAND/UCLA is a rigorous and explicit method based on the involvement of user representatives and professionals in the field to which the guideline relates, as well as on the use of an external peer review phase, transparency, independence of development, and management of conflicts of interest.

The first step in the process consisted of inclusion of working group experts. The selection of experts was based on their experience in managing patients with MS from

different regions of Argentina. The working group was then divided as follows: (i) a steering group and project manager (ii) a rating group who, in their daily practice, are directly involved in patient care and (iii) an external peer review with expertise in the MS field. After the working group was conformed, the procedure consisted of the following phases:

1. Systematic review and synthesis of the literature phase: A systematic non-language restricted literature search was conducted using several online databases including MEDLINE and EMBASE for the period 1990–2021. All searches contained a variant of the following search terms: "multiple sclerosis AND (telemedicine OR telehealth OR teleneurology)" with the modifiers "diagnosis", "disability", "cognitive impairment", "care", "treatment", "personalized", "response", "suboptimal", "biomarkers", "precision", and "guidelines". Members of the steering group met to discuss the evidence and to develop the list of statements to be submitted to the rating group. Relevant clinical papers were distributed to the working group for review and summarization so that they could answer the statements and recommendations of discussion.

2. Development of statements list: A list of statements developed by the steering group was submitted to the rating group in the form of a questionnaire. At this stage, the statements complemented or contradicted each other in so far as they considered all opinions expressed by the group members during the work sessions.

3. Rating phase: This phase took place in three stages: in the first one the statements on which members of the rating group agreed were identified. For those statements in which there was no agreement or undecided responses, three rounds of votes were conducted with interim feedback sessions based on the published evidence and discussion in real time by teleconference. After the first round and the meeting with the panel of experts, three statements were added that were not initially considered. The rating phase finished with the selection of the statements on which there was a consensus within the rating group and statements without agreement after the final round were eliminated. Consensus was defined when 70% of the participants agreed and lack of consensus when $\geq 30\%$ disagreed. The methodology for the rating and the analysis of the scores were defined initially and communicated to the rating group during the invitation phase by email and prior to the first round. After panel acceptance by email, a real-time meeting by teleconference with the objective of clarifying the process was also carried out. At every stage of the rating phase, members of the rating group were able to comment about their response on any statement. All the received comments were also analyzed in a qualitative manner to be included if appropriate.

4. Drafting the initial version of the guideline phase: The steering group along with the project manager drafted the first manuscript version of the consensus recommendation to be submitted to the peer review group based on the consensus statements. This material was also reviewed by an external peer review with expertise in the MS field.

5. Peer review phase: An analytical report was drafted, drawing together all scores and comments of the peer review group members and, where applicable, of the participants in the public consultation.

6. Finalization phase: The final version of the evidence reports, the consensus recommendations, and a summary of the guideline were drawn. The validated versions of these documents were disseminated. Thus, the authors provided their final approval for all content.

General recommendations

General recommendations are shown in Table 1. Although there are several definitions of telemedicine published in the literature [1, 5], the panel has reached consensus regarding its definition for these recommendations based on a clear and practical approach. We have also highlighted using video calls to communicate in real time with MS patients, as it can be used for patient consultations requiring a basic neurological examination at a remote medical facility or the home. It is important to highlight that the panel strongly recommended that telemedicine does not replace face-to-face consultation, especially considering the complexity of this disease in terms of diagnosis, neurological examination (sometimes minimal or subtle changes are observed, including cognitive impairment) and follow-up [8, 14, 15]. Likewise, as recommended in others' consensus, MS patients must be diagnosed and followed up by neurologists with expertise in demyelinating diseases in in-person models as in virtual care [16]. The panel reported that other ways of communication could be also used as additional tools to review a lab test or observe and compare an MRI scan, among others. Importantly, most MS patients are young adults (between 18 and 50 years of age) [17], but many patients have no access to computers or the Internet or are unable to carry out a video call, particularly in developing countries like Argentina [3]. However, the accrual burden of disability in MS patients can make traveling to MS centers increasingly difficult for them, therefore making telemedicine an engaging option [14, 18]. Some studies have specifically compared telemedicine with in-person visits in terms of access to MS care [2, 7, 19, 20]. At the same time, sensor-based monitoring tools have started to fill a critical gap between MS investigation and clinical care. Recently, European MS experts have reported

Table 1 General recommendations

1.1 Telemedicine for this consensus is defined as the use of technology to provide access to patient care when distance separates patients and neurologists
1.2 Teleneurology is an evolving branch of telemedicine defined as neurologic consultation at a distance, or not face-to-face, using different types of technologies to achieve connectivity
1.3 Teleneurology is useful for the management of patients with MS and has benefits in saving time and cost related to transfers of patients and/or caregivers, providing greater comfort for patients, and enhancing safety in epidemiological situations such as the COVID-19 pandemic, among others
1.4 Teleneurology does not replace face-to-face consultation, but it is a complementary tool
1.5 The use of clinical video teleneurology (CVT) through Internet-based videoconferencing is recommended allowing neurologists and MS patients to communicate in real-time
1.6 In the case of MS patients without access to video calls, telephone consultation may be employed as a complementary tool
1.7 The use of emails and text messages do not replace CVT and telephone consultation
1.8 Telemedicine should adapt the video or phone call to the specific aspects of each MS patient to be attended: personal background and characteristics of the receiver such as age, cognitive, sensory, motor deficits, and patient caregivers, among others
1.9 Specific mobile applications for MS patients can be used to improve their condition of self-management and to be able to obtain a remote follow-up of the evolution of the patient
1.10 The use of telemedicine in patients with suspected MS should be applied by a trained MS neurologist to ensure an earlier and precise diagnosis
1.11 Neurologists must adhere to the same ethical standards and code of conduct, whether the telemedicine service is sourced locally or from abroad
1.12 The teleconsultation must maintain the same quality as a face-to-face consultation, and the neurologist must maintain intimacy and privacy when connected with the patient
1.13 The neurologist is responsible for safeguarding the confidentiality of the patient's data in a medical record during the telemedicine consultation
1.14 During the telemedicine consultation, it is recommended to implement security protocols that comply with international standards for the safety and quality of patient data

that the Floodlight Proof-of-Concept application, a sensor-based monitoring tool, can effectively capture reliable and clinically relevant measures of functional impairment in MS patients, supporting the potential use in clinical practice and investigation [21]. Thus, the neurologists could potentially use that relevant information in the future as a complement to their visits [22]. The evaluation and the optimal control of the progression should be considered to minimize or eliminate this possibility in all patients. To reach this objective, an attractive option is to use sensitive tools for monitoring disability in all MS patients, even in patients whose disease activity seems to be under control in terms of disease activity such as new lesions on MRI and relapses [21]. In this context, the use of remote technologies to detect the onset of the progression or worsening is critical to timely adapt the therapeutic strategies [22].

On the other hand, there are many issues of concern about the ethical and legal aspects of telemedicine. Responsibilities and potential liabilities of the clinicians, maintaining the privacy and confidentiality of medical records, and the jurisdictional issues related to local or from abroad televisits [23]. Neurologist using telemedicine should consider that, during telemedicine consultation, some risks may exist. These risks may fall into gaps in patient's and physician's coverage. In this context, there are no specific regulations in Argentina regarding insurance coverage for accidents that might occur during telemedicine consultation. All telemedicine services must protect patient information. At the same time, bioethical principles of justice, autonomy, beneficence, and non-maleficence must also be applied like in-person care [23, 24]. In addition, another problem is related to reimbursement using the telemedicine service. Telemedicine services across countries have started to work many years ago, but doubts about jurisdiction and registration have not been answered accurately, yet [25]. Although some legal and ethical aspects of telemedicine have not been defined properly, it is also the case that clinicians who undertake telemedicine services in a prudent way will minimize the likelihood of medico-legal complications, in line with in-person visits [23, 24].

Carrying out the diagnosis of MS through telemedicine

Diagnosis of MS through telemedicine recommendations is shown in Table 2. Considering that MS diagnosis entails a complex diagnostic process, the panel suggested that the incorporation of telemedicine during this process should be carried out in conjunction with face-to-face consultations. In addition, the panel did not reach a consensus on whether the 2017 McDonald diagnostic criteria can be applied through telemedicine, highlighting that in-person visit with neurological examination must be performed in this important stage. Diagnostic criteria for MS combine clinical, imaging, and laboratory evidence. However, the experts that worked on the most recent revision of the

Table 2 Carrying out the diagnosis of MS through telemedicine

2.1 Telemedicine might be used as an additional tool during the diagnostic process of MS, this process requiring face-to-face consultation(s)
2.2 Telemedicine can be used for the follow-up of MS patients, as long as it is not the only type of evaluation
2.3 Some clinical and complementary aspects for the diagnosis of MS can be evaluated by means of telemedicine
2.4 When the diagnostic process has been completed and taking into account the patient's requirements, the diagnosis of MS might be communicated by means of telemedicine using video call
2.5 In case of diagnosis uncertainties or insufficient clinical data, a face-to-face evaluation is recommended

McDonald criteria did not clarify what type of medical consultation should be used for the diagnosis of MS (face-to-face or virtual). They emphasize the importance of physical examination and clinical manifestations [26]. In this aspect, telemedicine has a limitation on the feasibility to perform a complete neurological examination. Although the AAN has released formal guidelines for remote neurologic exams, there is still no reliable way to evaluate all functional systems such as brainstem, sensory, motor, reflexes, or visual function [3, 27]. This limitation poses a concern for potential misdiagnosis and mismanagement. Misdiagnosis of MS remains an issue in clinical practice, and there are several factors that potentially increase this risk, even in specialized medical centers [28, 29]. Moreover, there is no single pathognomonic clinical feature or diagnostic test for diagnosing MS. Recent studies have demonstrated that a wide range of conditions can be mistaken for MS [28, 29]. In addition to requiring proper clinical examination, misapplication of McDonald's radiological criteria is another leading cause of misdiagnosis. However, the panel considered that using the appropriate technology and complementary studies, including MRI and radiological criteria to MS diagnosis, can be evaluated by telemedicine in a similar way to in-person visit. In this regard, lumbar puncture may be needed in some cases to make MS diagnosis, it being another possible limitation for telemedicine, as this procedure has to be performed in an in-person visit.

Following the initial diagnosis and evaluation stage, the panel considered that the MS patients' follow-up could be carried out using telemedicine. In fact, one of the most common applications assessed was the use of telemedicine in the longitudinal management of MS patients [5]. A review involving 28 studies and 3252 participants showed that telemedicine has been demonstrated to be technically feasible in MS patient care practice [5]. A recent investigation that compared telemedicine (video consultation) with face-to-face consultation reported wide MS patient acceptance of telemedicine, and most of them reported that they would opt for telemedicine in the future. The convenience, ease of communication with neurologists, and cost and time savings using telemedicine were highlighted [7]. Other studies also found both patients and health workers seemed to be satisfied with the telemedicine for general MS care services and longitudinal follow-up [10, 30, 31].

Follow-up: assessing disability and relapses in MS on teleneurology

The evaluation of disability and relapses through telemedicine recommendations is shown in Table 3. The American Academy of Neurology (AAN) has published recommendations for implementing a telemedicine service, suggesting that general neurological examination is feasible remotely, but with some caveats [8]. As mentioned above, there are difficulties in comprehensive neurological examination. For example, fundus, deep sensitivity, reflexes, or tone cannot be evaluated using telemedicine. Other neurological aspects of the exam depend on enough space such as gait testing or the availability of a caregiver to assist (such as sensory testing). A survey designed in order to investigate telemedicine follow-up of South American MS and NMOSD patients showed that 44.1% of the experts were able to carry out neurological examinations via telemedicine, and the majority was not able to evaluate the sensitivity and visual test [3].

Although there is no general agreement on MS-specific neurological examination using telemedicine, it has previously been validated as a tool for assessing disability in MS with high patient acceptability [5]. A reliable virtual examination could allow MS specialists to remotely evaluate patients who are fairly clinically stable, while sparing patients the financial and opportunity costs, caregiver burden, and traveling to their clinical appointments. For this reason, the panel recommended telemedicine to assess the disability of MS patients, using Tele-EDSS or web-based EDSS. Both Tele-EDSS and webcam-based EDSS have been previously tested with great acceptance by patients and providers. Tele-EDSS is the telemedicine tool to assess EDSS remotely, and it requires the use of a "neurological home kit" with a vision card, tuning fork, pin, cotton swab and alcohol swab, and a caregiver to help with the exam [15]. Tele-EDSS showed a good correlation with the in-person EDSS. Correlation for individual functional systems ranged from modest (vision: 0.37) to high (bowel/bladder: 0.79). Overall correlation between EDSS and tele-EDSS was 0.89 ($p < 0.0001$) and 0.98 ($p < 0.0001$) at EDSS range 4–7 [15].

Table 3 Follow-up: assessing disability and relapses in MS on teleneurology

3.1 Neurological examination can be partially performed using video call. Limitations are recognized for the evaluation of sensory, sensitivity, cranial nerve evaluation, vestibular examination, reflexes, and tone, among others
3.2 The neurological examination via video call does not replace the face-to-face physical examination, although it can provide the neurologist with certain information about the patient's physical characteristics
3.3 The use of "tele-EDSS" thought telemedicine is useful during patient follow-up to determine the impact of MS
3.4 The use of webcam-based EDSS is recommended in those MS patients with EDSS > 6.0 who live at considerable distances from specialized centers, since it provides clinically valid information
3.5 The use of a webcam-based EDSS as the only via of evaluation is not recommended in those MS patients with EDSS < 6.0 as subtle neurological deficits cannot be identified
3.6 The use of the patient-determined disease steps (PDDS) thought telemedicine is useful during patient follow-up to determine the impact of MS
3.7 The timed 25-foot walk (T25FW) can be evaluated at home if MS patients or their caregiver are instructed previously
3.8 Beck Depression Inventory II (BDI-II) can be used through teleconsultation as a specific tool to report depressive symptoms
3.9. Fatigue severity scale (FSS) can be used through teleconsultation as a screening tool for fatigue
3.10 The use of the multiple sclerosis international quality of life questionnaire (MusiQoL) is recommended as a specific quality of life measurement through teleconsultation
3.11 The subjective report of cognitive alterations can be evaluated by means of telemedicine, using a self-report questionnaire with validations in the local population
3.12 A full neuropsychological assessment can be applied through video call, using tests with validations in the local population and when face-to-face consultation has not been possible
3.13 A self-administered neuropsychological assessment can be conducted by means of telemedicine using tests with validations in the local population and when the face-to-face consultation has not been possible
3.14 The remote version of symbol digit modalities test (SDMT) can be useful as a screening tool for cognitive assessment or as a complement to comprehensive evaluations
3.15 A comprehensive neuropsychological face-to-face assessment for anyone who tests positive in remote SDMT screening test should be performed
3.16 The administration of the remote version of SDMT should be guided by a trained professional
3.17 Virtual neurological and cognitive monitoring measures should be validated in Argentina

Webcam-based EDSS showed a high correlation and showed no significant differences compared to face-to-face exams, particularly those with greater disability (EDSS > 6.0). The panel recognized certain limitations to these web tools. It has already been mentioned that the Tele-EDSS needs a neurological home kit with an approximate cost of 20 US dollars, which could represent an access problem in Argentina. On the other hand, the webcam-EDSS seems to have a low correlation with patients with little disability (EDSS < 6), which limits its use in this group of patients.

Patient-determined disease steps (PDDS) has been specifically developed as a patient-reported outcome measure of MS disability and has been validated in multiple languages [32, 33]. It is also available to be used online. In a recent Latin American study, almost 50% of experts are currently using PDDS to replace EDSS in remote examination [3]. The PDDS is strongly correlated with EDSS and especially with some functional systems (such as visual, pyramidal, cerebellar, sensory, bowel/bladder, and ambulatory) [32, 33]. Regarding T25FW, a randomized, controlled study showed no significant difference in the T25FW following 12 weeks of Internet-based physical therapy compared with usual care in MS patients. Additionally, the authors also found that participants who were less familiar with the internet needed more technological support and showed decreased login rates during the course of the program [5, 34].

Patient-reported outcomes (PROs) are increasingly used in MS research and clinical practice for understanding the effects that the disease and its treatments have on patients' lives [35]. PROs are captured directly from patients and are especially useful to assess symptoms such as depression, cognition, and fatigue and to objectify the impact of the disease and patients' quality of life [36]. Being able to administer this kind of instruments remotely has multiple advantages that were mentioned in previous sections, but the possibility of a more comprehensive follow-up of patients and its usefulness in research studies with large samples are highlighted [37]. Although there are controversies about the remote administration of questionnaires, mainly based on possible technical or understanding difficulties when completing them, there are studies that show the equivalence between this type of administration and pencil and paper one [38]. BDI-II is frequently used to assess depressive symptomatology in patients with MS and has an equivalence study that demonstrates robust psychometric properties to be administered remotely [39]. Fatigue is one of the most common symptoms in MS reported in 51–90% patients, according to a recently published meta-analysis [40], and one of the most used inventories to measure perceived fatigue is the FSS [41]. Although, to our knowledge, there are no equivalence studies with the remote version, it has been

used in studies showing reliable results [42]. Assessing the impact of MS on the health-related quality of life (HRQoL) of patients is extremely relevant for patient-centered monitoring, which is why having the possibility of measuring it remotely is of outstanding utility. Previous studies have evaluated the HRQoL from online questionnaires [43] or telephone surveys with good response. The MusiQol, which has been validated in Argentina [44] and has a recent study, in which a virtual survey format was used is therefore considered a plausible tool to be used [45].

Cognitive complaint self-report questionnaires have validated virtual versions, as is the case of the multiple sclerosis neuropsychological questionnaire [46] which has its online version as part of the Buffalo Vocational Monitoring Survey [47].

Considering the high prevalence of cognitive impairment in patients with MS, and the impact that these symptoms generate in the different daily activities of patients [18], it is important to be able to evaluate it beyond the difficulties that some patients may have in approaching health centers. Although there are currently several computerized neuropsychological measures, many of which allow patients to be evaluated remotely, there are opposite opinions about the usefulness of these tests, mainly focused on weak reliability and validity results [48]. Nevertheless, there are studies that show that both automated batteries [9] and remote versions of MS validated tests [49] could be equivalent to face-to-face measurements. One of the measures considered reliable to manage remotely is the SDMT [50]. This is relevant data, since the International Multiple Sclerosis Cognition Society recommends this test as a sensitive screening measure to detect patients at risk of cognitive impairment [51]. Although a large amount of data reported to date is promising, the implementation of computerized or remote assessment instruments requires local validation studies of administration procedures, standardization of stimuli, and appropriate normative data, to yield reproducible and useful results both clinically and in research [48].

Identification and treatment of relapses

Identification and treatment of relapses recommendations are shown in Table 4. Previous studies have shown the usefulness of telemedicine for the identification of relapses during the beginning of the COVID-19 pandemic [52]. On the other hand, recommendations for the identification of relapses using telemedicine were also published during the pandemic [14, 53, 54]. A recent Argentinean publication describes the approach of the whole relapse process with fully telehealth management, from its diagnosis (onset) through the indication of oral methylprednisolone pulse at home, with close monitoring and follow-up of the patients until its resolution or stabilization. The results showed this was a safe and effective mean to treat MS and NMOSD relapses [54]. Therefore, if some elements are relatively easy to assess remotely (e.g., timing of symptoms, history of concomitant fever, symptoms of infection, among others) and neurological abnormalities could be detected as suggested above (Tele-EDSS, webcam-based EDSS, or PDDS), a relapse diagnosis could be made using telemedicine. In doubtful cases or when the patients cannot clearly refer to their symptoms, face-to-face evaluation is strongly recommended. Regarding the treatment of a relapse, corticosteroids are often the first treatment option for MS relapses [54]. Several clinical trials and two meta-analyses provide evidence that high-dose corticosteroids hasten neurological recovery and improve EDSS after MS relapse [55, 56]. To date, there remains considerable variability in the dosage, type, and duration of corticosteroid regimens used for relapsing MS. A recent review showed that there were no significant differences between the oral route of administration of corticosteroids compared to the intravenous route. In addition, there is evidence to support the use of oral corticosteroids at home [57–60].

Disease-modifying treatments

Long-term treatment recommendations are shown in Table 4. Within MS care, there are several opportunities to capitalize on the benefits of telemedicine for clinical

Table 4 Identification and both treatment of relapses (4) and DMTs (5)

4.1 Relapses can be assessed using teleneurology
4.2 Telemedicine is useful to determine the impact of MS relapses during patient follow-up
4.3 An acute treatment for MS-related relapse can be indicated by telemedicine. Corticosteroids orally (at home) or IV (at hospital) can be prescribed through telemedicine
4.4 Patients with inadequate response to steroid therapy due to an acute relapse should be evaluated face-to-face
4.5 Face-to-face examination should be considered for cases where a relapse cannot be fully excluded
5.1 When the diagnostic process has been completed and considering the patient's requirement, disease-modifying treatments (DMT) can be prescribed by means of telemedicine using video call
5.2 Telemedicine can be used to monitor adverse effects and mitigate risk associated with DMTs in MS patients
5.3 Telemedicine can be used to monitor adherence to DMT in patients with MS
5.4 Telemedicine can be used to monitor satisfaction to DMT in patients with MS

care. Following the initial diagnosis and evaluation of a patient with MS, a dedicated follow-up visit is usually necessary to discuss DMT options. Telemedicine offers the patient a benefit of avoiding time, access problems, and costs associated with moving from home to the hospital [61]. Although there are no studies that demonstrate the benefits of telemedicine in monitoring treatment, the panel considered that telemedicine also offers the opportunity to evaluate some aspects such as adherence, adverse effects, and DMTs satisfaction. A randomized controlled pilot study found that brief telephone counseling was associated with better adherence to DMT among veterans with MS. Another study showed that teleneurology home monitoring improved MS disease modified therapy adherence monitoring and outcomes [9, 62–64].

Conclusions

Teleneurology can increase accessibility by bringing care to the patient and improve quality by monitoring and engaging with patients and enhance patient experience through greater convenience and access. A consensus on the use of teleneurology for the management of people with MS was achieved with a panel of experts using the methodology of "formal consensus RAND/UCLA Appropriateness method." We recommended the use of this guideline to all Argentine neurologists dedicated to the management of people with MS. Our study is not exempt from limitations, which are fundamentally related to the fact that most of the tools recommended in this consensus have not been validated in our country. Pilot studies on the use of these good practice criteria in the management of teleneurology are recommended to analyze their operability, satisfaction, and quality.

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Declarations

Ethics approval and consent to participate Not applicable, as this is a consensus recommendation paper based on critical review of the literature, and no human participants and/or animals were included.

Informed consent This study did not include human participants and/or animals; therefore, informed consent was not requested.

Conflict of interest The authors declare no competing interests.

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