Received: 9 April 2024 | Accepted: 24 June 2024

DOI: 10.1111/ene.16408

european journal of neurology
the official journal of the european academy of neurology

GUIDELINES

Management of patients with neurological diseases considering post-pandemic coronavirus disease 2019 (COVID-19) related risks and dangers — An updated European Academy of Neurology consensus statement

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Abstract

Background and purpose: In October 2020, the European Academy of Neurology (EAN) consensus statement for management of patients with neurological diseases during the coronavirus disease 2019 (COVID-19) pandemic was published. Due to important changes and developments that have happened since then, the need has arisen to critically reassess the original recommendations and address new challenges.

Methods: In step 1, the original items were critically reviewed by the EAN COVID-19 Task Force. In addition, new recommendations were defined. In step 2, an online survey with the recommendations forged in step 1 was sent to the Managing Groups of all Scientific and Coordinating Panels of EAN. In step 3, the final set of recommendations was made.

Results: In step 1, out of the original 36 recommendations, 18 were judged still relevant. They were edited to reflect the advances in knowledge and practice. In addition, 21 new recommendations were formulated to address the new knowledge and challenges. In step 2, out of the 39 recommendations sent for the survey, nine were approved as they were, whilst suggestions for improvement were given for the rest. In step 3, the recommendations were further edited, and some new items were formed to accommodate the participants' suggestions, resulting in a final set of 41 recommendations.

Conclusion: This revision of the 2020 EAN Statement provides updated comprehensive and structured guidance on good clinical practice in people with neurological disease faced with SARS-CoV-2 infection. It now covers the issues from the more

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recent domains of COVID-19-related care, vaccine complications and post-COVID-19 conditions.

KEYWORDS
COVID-19, immunomodulatory, multiple sclerosis, post-COVID-19 syndrome, SARS-CoV-2, vaccine

INTRODUCTION

Since its recognition as a new viral disease in December 2020, coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), went on to become a pandemic in an extremely short period of just 4 months, causing millions of deaths across the globe. The COVID-19 pandemic put an unprecedented strain on health services globally, unveiling their multiple weaknesses and posing some completely new challenges to the system of care and the medical personnel. Healthcare provision to people suffering from neurological diseases was not exempt from this. Many neurological conditions are often chronic or long-standing, requiring frequent interactions with health providers and access to complex medical procedures and treatments. The restrictions in access caused by the pandemic had a severe impact on the care of people with neurological conditions [1].

To address the newly emerged needs, in October 2020 the European Academy of Neurology (EAN) published the EAN consensus statement for management of patients with neurological diseases during the COVID-19 pandemic [2]. In the absence of robust evidence, the EAN relied on the expertise of its scientific panels to face the emergency and provide practising neurologists with guidance. Thus, the consensus statement was made using a Delphi process through a series of surveys which included members and co-chairs of all Scientific Panels (SPs) of the EAN, thus covering almost all neurological specialist areas. The consensus statement included four sections of recommendations covering the organization of care, management of acute neurological diseases, management of neurological COVID-19 complications and management of existing chronic neurological conditions.

Fortunately, over time, due to the combined effects of increased population immunity due to vaccination and natural infection, virus mutations and adaptations/improvements in healthcare provisions, the incidence of COVID-19 dropped considerably whilst, even more importantly, the mortality was significantly reduced. This led the World Health Organization (WHO) to officially declare the end of the COVID-19 pandemic in May 2023.

Nevertheless, despite the global and undisputable improvements in the health and social burden imposed by the initial strike of the pandemic, the infections with SARS-CoV-2 have not ceased. Infections and re-infections with SARS-CoV-2 are still occurring at a quite high rate across the planet with occasional localized outbreaks [3–5]. The note should be made that current official numbers probably underestimate the real prevalence of infections since in most countries active surveillance measures have stopped, whilst, due to the milder symptoms, most people infected do not seek medical treatment nor perform self-tests and thus escape the attention of health services.

Although risks from SARS-CoV-2 infection to the general population have diminished, this may not be the case for people with various, often chronic, health conditions as well as those treated with immunosuppressive drugs. Many neurological diseases, such as multiple sclerosis, epilepsy, myasthenia, Parkinson's disease, Alzheimer's disease, to name just a few, as well as post-stroke and post-head-injury states, are chronic conditions with more or less increased levels of vulnerability potentially exposing affected individuals at increased risk from the direct and associated effects of the SARS-CoV-2 infection [6–11]. In addition, people with neurological conditions who require immunosuppressive and/or immunomodulatory treatment are facing various COVID-19-related challenges [12, 13].

Vaccination has been one of the core tools for limiting the spread of the SARS-CoV-2 infection and it is still the best approach for the prevention of possible complications in vulnerable people [14, 15]. However, although vaccination is generally safe, the vaccines are not devoid of side effects which are quite rare but should be kept in mind particularly when dealing with people with chronic neurological diseases and conditions (e.g., [16]). This is especially the case for the various conditions where neuroimmunological mechanisms play a significant role [17–19].

Another issue, that has emerged during the COVID-19 pandemic and is still present, is the persistence of various symptoms long after the SARS-CoV-2 infection has ceased. Sometimes called long COVID, this set of prolonged symptoms lasting for weeks and months after the initial COVID-19 is now recognized as the 'post-COVID-19 syndrome' [20, 21]. The incidence of this syndrome may even be up to 30% following SARS-CoV-2 infection [22]. The sheer number of people who have been and are still affected by the infection worldwide makes it a prominent health problem.

Given all the changes and developments over the last 2 years, the need has arisen for an update of the EAN 2020 Statement that would address them. Some of the original statements and recommendations became outdated whilst new challenges were required to be dealt with.

METHODS

The process of producing the current update involved three steps led by the first two authors (Figure 1). To establish the final set of recommendations, a Delphi model was applied, similar to the one used for the previous version of the Statement.

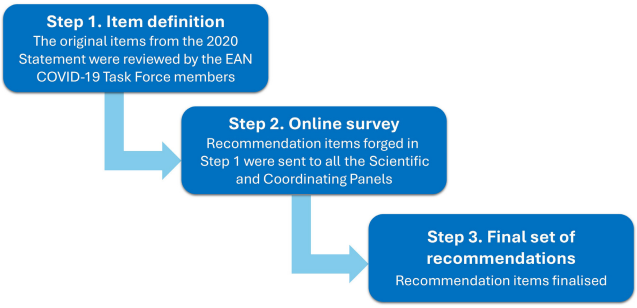

FIGURE 1 Diagram of the three-step process for developing the updated recommendations.

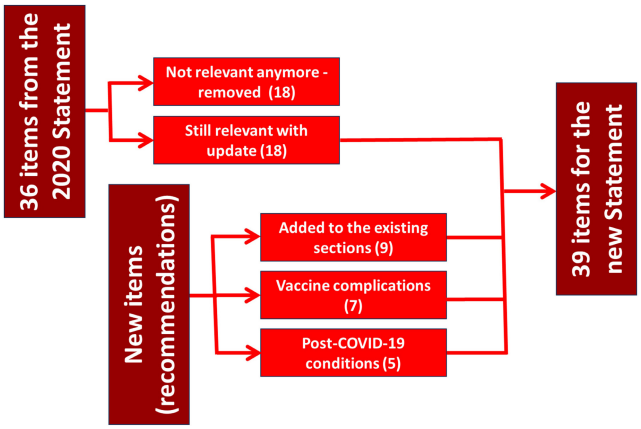

FIGURE 2 Diagram of the decision process in step 1.

Step 1. Item definition

In this first step (Figure 2), the 36 original items from the 2020 Statement [2] were reviewed by the EAN COVID-19 Task Force members (www.ean.org). The Task Force is a 19-member body formed by representatives from the various EAN SPs, encompassing the width and depth of the field of neurology practice and related scientific activities. A considerable number of current members participated also in the 2020 Statement. In two rounds of consensus consultations, the original items were critically assessed concerning their continued validity and accuracy of their content regarding the experience accumulated since their publication. They were classified into two groups. The statements found not to be relevant anymore as well as those found not to accurately represent the current knowledge were removed from further process. On the other hand, the statements found to be still relevant and which can be kept but updated in line with the knowledge and experience gathered over the last 2 years were further edited to accommodate the new developments.

In addition, when considered to be needed, new statements were defined covering new developments and understanding in the areas previously included in the 2020 Statement. Finally, a set of new statements dealing with the emerging issues related to vaccine complications [12, 13, 16, 23, 24] and post-COVID-19 symptoms [25, 26] was also developed.

Step 2. Online survey

In the second step, an online survey with the statements/recommendations forged in the first phase was sent to the members of the Managing Groups of all 28 SPs and three Coordinating Panels (CPs) of the EAN (Table 1). The survey was sent to 178 unique email addresses from the EAN database representing individual members of the SP and CP Managing Groups with the aim of receiving at least one response from each panel, although there was no restriction on the number of responses per panel. The survey asked participants to mark each statement with either 'remove', 'keep' or 'keep with changes'. In the latter case, a suggestion on how to change the statement was asked for. In addition, two open questions, at the ends of the vaccine complications and post-COVID-19 condition sections, requested participants to suggest any other statement considered relevant to the subject. The questions asked for vaccine complications that were not mentioned in our statements and for new statements/recommendations regarding the post-COVID-19 condition, respectively. Only the SP/CP membership and gender data were collected from participants. The anonymized responses were used in further process. The survey was open for 3 weeks, from 17 April to 7 May 2023.

Step 3. Final set of recommendations

In the third step, after checking for the representativeness of the participants (i.e., whether most of the areas represented in EAN were covered), statements were looked for that should be removed from the further process. These were defined as either statements with a high proportion of negative votes (i.e., 'remove'), with the threshold set at 30%, or statements with low proportions of approval votes (i.e., 'keep' or 'keep with changes'), with the threshold set at 50%. The statements that received complete approval (i.e., 100% response 'keep') were kept as they were (Figure 1). Finally, the statements that received conditional approval (i.e., more than 50% of votes either 'keep' or 'keep with changes') were edited to accommodate the suggestions given by the survey participants as well as the data published in the meantime. The edited statements were evaluated by the Task Force members through several cycles of discussions until a consensus was reached.

RESULTS

Step 1. Item definition

In the first step (Figure 2), out of 36 original statements 17 were judged not to be relevant anymore. These were all the statements belonging to the sections 'Recommendations on organization of care during the COVID-19 pandemic' (12 items) and 'Recommendations on overall management of neurological COVID-19' (five items).

TABLE 1 Recommendations on treatment of neurological conditions during the time of increased risk for SARS-CoV-2 infection.

1. Neurological diseases requiring intensive care unit admission (e.g., traumatic brain injury, ischaemic stroke, haemorrhagic stroke, status epilepticus, neuro-immunological diseases) should be managed according to the current practice and according to established guidelines, independently of the SARS-CoV-2 status. However, known contraindications and possible complications due to the concomitant COVID-19 infection should be considered
2. There is currently no evidence to support the assumption that inhibition of complement using monoclonal antibodies, such as eculizumab or ravulizimab, increases susceptibility to SARS-CoV-2 infection or affects the outcome
3. Before starting therapies with immune-depleting properties or primary immune suppressive agents (i.e., ocrelizumab, rituximab, cladribine, alemtuzumab, mitoxantrone, ofatumumab, all sphingosine-1-receptor modulator drugs), the risk of immunosuppression and susceptibility to infections within several weeks after treatment initiation must be evaluated
4. The risk of severe COVID-19 is increased in people receiving anti-CD20 treatments. Thus, a risk–benefit evaluation should be made, taking also into account other risk factors including age and comorbidities, as well as the vaccination status, before treatment initiation
5. For multiple sclerosis, all approved disease-modifying therapies, apart from CD20 inhibitors and fingolimod, can be safely initiated, providing the absence of active COVID-19. The COVID-19 vaccination (or vaccination booster) before starting treatment with disease-modifying therapies should be recommended, in accordance with national guidelines, and the risk of severe COVID-19 considered
6. *If there is an increase in the SARS-CoV-2 infection rate in the region*, it may be advisable to delay *the initiation* of cell-depleting or immunosuppressive therapies until the situation improves, also depending on the vaccination status of the person requiring treatment. For those patients in whom the risk of not starting cell-depleting or immunosuppressive therapy outweighs the risk of severe COVID-19, there should be no delay in starting the treatment. This should be discussed with the patient in detail
7. Patients can *continue* with immunosuppressive treatments, with the exception of the anti-CD20 therapies where more caution is needed, even if there is an increase in the SARS-CoV-2 infection rate in the region
8. There is no evidence to suggest that either intravenous immunoglobulin (IVIg) or plasma exchange (Plex) increases the risk of SARS-CoV-2 infection
9. *If there is an increase in the SARS-CoV-2 infection rate in the region*, Plex and IVIg should be used with caution for people with acute exacerbation of the neurological disease
10. If a person with ongoing cell-depleting properties, therapies or primary immune suppressive agents (such as ocrelizumab, rituximab, cladribine, alemtuzumab, mitoxantrone, ofatumumab, all sphingosine-1-receptor modulator drugs) *is affected by COVID-19*, the timing of retreatment should be revised, based on the individual risk–benefit profile, considering also the severity of the infection and the time elapsed from the resolution of COVID-19, and, when possible, delayed. Otherwise, alternative options should be considered
11. *If a person has an active infection with SARS-CoV-2*, immunosuppressive treatments should be delayed at least until the resolution of the acute symptoms, unless the need for immunosuppressive therapy is such as to supersede the risk of aggravating an acute COVID-19
12. *If a person is affected by COVID-19*, paracetamol is the treatment of first choice for antipyretic or analgesic treatment if no contraindications exist. Nevertheless, ibuprofen may be considered for antipyretic or analgesic use if deemed necessary and in the absence of alternatives (please consult the most recent European Medicines Agency advice)
13. *In people recovering from SARS-CoV-2 infection*, be aware of either new onset or worsening of previously diagnosed cardiovascular autonomic disorders, such as postural orthostatic tachycardia syndrome, recurrent vasovagal syncope and orthostatic hypotension

Abbreviations: COVID-19, coronavirus 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

Given that the COVID-19 pandemic had been declared ended, it was considered that the statements/recommendations would not be applicable anymore.

Moreover, from the section 'Recommendations on therapy of neurological symptoms/syndromes during the COVID-19 pandemic', one statement was also removed for the same reasons as above. The remaining statements in this and the subsequent section 'Recommendations for patients with chronic neurological conditions during the COVID-19 pandemic' were edited to reflect the advances in knowledge and practice. In addition, nine new statements (five in the section 'Recommendations on therapy …' and four in the section 'Recommendations for people …') were formulated to address the new knowledge and challenges.

Furthermore, 12 additional new statements aimed at addressing the newly emerging COVID-19-related issues in the care and management of people with neurological diseases and conditions were formulated and grouped in two new sections. Seven statements were developed for the section 'Recommendations on COVID-19 vaccine complications', whilst an additional five were developed for the section 'Recommendations on post-COVID-19 condition' ('long COVID').

Finally, at the end of step 1, there was a set of 39 statements/recommendations prepared for further elaboration (Figure 2).

Step 2. Online survey

Subsequently, the online survey was sent to the members of all Managing Groups of the SPs and CPs of the EAN as described in Methods. Eventually, 36 completed responses were received (17 women and 19 men). There was at least one response from 25 out of 31 panels, representing an 80.6% response rate (Table S1).

Nine items (23.1%) were approved as they were, whilst for 11 (28.2%) there was only one suggestion for revision. One item had

TABLE 2 Recommendations for people with chronic neurological conditions during the time of increased risk for SARS-CoV-2 infection.

14. People with chronic neurological conditions should be reinforced to maintain compliance with and supply of prescribed medication for their specific condition
15. Vaccination, in accordance with national guidance, should be considered in people with chronic neurological conditions exposing them to a higher risk of complications after COVID-19
16. During periods of high SARS-CoV-2 infection rates and depending on the local epidemiological situation, people on immunosuppressive medication should practise vigilant social distancing, including avoiding public gatherings/crowds and crowded public transport. In any case, they are strongly recommended to wear an FFP2 facial mask in those situations
17. In any case of acute signs of COVID-19, the continuation of immunosuppressive and immunomodulatory treatments should be considered and revised if necessary, depending on the underlying neurological disease, the pharmacodynamics of the treatment, the severity of the infection and other risk factors
18. Sphingosine-1-phosphate-receptor modulators (such as fingolimod, siponimod, ponesimod, ozanimod) are associated with an increased risk of respiratory infections. However, the cessation of this therapy is associated with a significant risk of flare-ups of disease activity in people with multiple sclerosis (including rebound activity). Therefore, they should be specifically advised about the risks and how to minimize the risks of infection
19. People with chronic neurological conditions should not stop their ongoing treatment during SARS-CoV-2 infection unless the treating physician advises them to do so
20. Ongoing plasma exchange (Plex) or intravenous immunoglobulin (IVIg) as maintenance therapy for different neurological conditions should be continued, if necessary. Precautions may need to be taken in high-risk areas because of the need for travel to and from a healthcare facility
21. In people with dementia, special attention should be given to symptoms of SARS-CoV-2 infection as these patients may not be able to report them
22. People with movement disorders (e.g., Huntington's and Parkinson's disease, atypical parkinsonism) and neuromuscular diseases (e.g., amyotrophic lateral sclerosis, myasthenia) may be particularly vulnerable to respiratory infections or pneumonia due to limited respiratory capacity related to reduced mobility of their thoracic cage. Therefore, it is important to counsel these people to undertake reasonable precautions for reducing exposure risk
23. People receiving immunosuppressive treatments (such as ocrelizumab, rituximab, cladribine, alemtuzumab, mitoxantrone, ofatumumab, all sphingosine-1-receptor modulator drugs) and/or people who are considered as being at risk of developing a severe COVID-19 due to their underlying condition must be offered an antiviral medication upon positive testing for SARS-CoV-2, unless contraindicated
24. Treatment options for SARS-CoV-2 infection include antiviral, immunomodulatory and immunosuppressive drugs, which may have drug–drug interactions with antiepileptic drugs. Hence, dose adjustments of antiepileptic drugs and/or COVID-19 treatment might be necessary
25. Treatment options for SARS-CoV-2 infection include antiviral, immunomodulatory and immunosuppressive drugs, which may have drug–drug interactions with immunomodulatory and immunosuppressive drugs already in use for the treatment of the pre-existing neurological condition. Hence, it is important to be vigilant for necessary treatment adjustments
26. Whilst certain infusion therapies (e.g., natalizumab, rituximab, ocrelizumab, alemtuzumab) may require travelling to infusion centres, the aim should be to continue these treatments. However, this decision should be based on the local situation (e.g., the regional incidence of SARS-CoV-2 infection, the resources available) and the risk/benefit balance for the individual patient

Abbreviations: COVID-19, coronavirus 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

eight suggestions, whilst for the others there were between two and five suggestions. One item had a borderline rejection rate of 30.6%. This is item 9 with the recommendation related to the use of plasma exchange and intravenous immunoglobulin (Table 1). The rationale was that it could be outdated. However, since this item also had a rather high rate of approval without change (63.9%), it was decided to keep it. All other items had less than a 5% rejection rate, except three which had rates of 16.7% (item 6), 8.3% (item 27) and 5.6% (item 5). The details on the survey results are given in Table S2. In addition, six participants provided suggestions for an additional post-COVID-19 statement.

Step 3. Final set of recommendations

The items for which there were suggestions for change were further edited to accommodate the participants' suggestions [27, 28] as well as the data published in the meantime [29]. Survey items 12 and 13 were merged into a single item/recommendation (item 12 in the final set). Finally, three new items were formed based on the participants' suggestions from the last question. The new items were added to the items from step 2, thus forming a final set of 41 statements/recommendations (Tables 1–4).

DISCUSSION

Publication of the 2020 EAN COVID-19 Statement came at a time when the COVID-19 pandemic was raging in its first year, and the medical community was facing numerous uncertainties and unknowns. The statements fulfilled a much-needed requirement for a structured consensus statement on good clinical practice in patients with neurological disease during the COVID-19 pandemic, providing immediate guidance for neurologists of various subspecialties.

Since then, addressing changes in the understanding of the disease and its management, as well as changes in the SARS-CoV-2

TABLE 3 Recommendations on COVID-19 vaccine complications.

27. Within the first month after receiving a COVID-19 vaccine, there is no convincing evidence of an increased risk of worsening underlying neurological disorders or deficits
28. Within the first month after receiving a COVID-19 vaccine, there is an increase in the likelihood of people developing non-specific neurological symptoms, such as headache, fatigue, myalgias, generalized weakness, orthostatic intolerance and syncope, which are in most cases self-limiting and mild
29. Within the first month after receiving a COVID-19 vaccine, there is a small increase in risk for people to develop serious demyelinating/inflammatory neurological events, such as Guillain–Barré syndrome, acute diffuse encephalomyelitis, transverse myelitis and encephalitis, as well as focal neuropathy and facial palsy
30. Within the first month after receiving a COVID-19 vaccine, there is a small increase in risk for people to develop seizures
31. Within the first month after receiving a COVID-19 vaccine, there is a very small increase in risk for people to develop cerebral venous thrombosis, which seems to be predominantly associated with vector-based vaccines
32. COVID-19 mRNA vaccines are associated with an increased risk of herpes zoster virus reactivation/neuralgia. Further studies are needed to better assess this risk
33. Although there is a small increase in risk for developing neurological adverse effects following COVID-19 vaccination, they are far outweighed by the dangers associated with acute SARS-CoV-2-infection as well as the rates of neurological and other health complications following acute SARS-CoV-2 infection; therefore, this cannot be an argument to avoid or delay vaccination, which should be recommended based on the epidemiological situation and in accordance with the national guidelines on COVID-19 vaccination

Abbreviations: COVID-19, coronavirus 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

TABLE 4 Recommendations on post-COVID-19 condition (long COVID).

34. After recovery from COVID-19, some people may develop fatigue, muscle aches, problems with memory and attention/concentration ('brain fog'), insomnia, depression and anxiety, orthostatic intolerance, sensory symptoms and tinnitus. These may be the symptoms of the post-COVID-19 condition, sometimes also called long COVID syndrome
35. Before attributing any of the symptoms that have developed following recovery from COVID-19 to the post-COVID-19 condition, a thorough diagnostic search for other causes for the symptoms should be done
36. Post-COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually within 3 months from the onset of COVID-19, with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis
37. Symptoms of the post-COVID-19 condition may be new onset, following initial recovery from an acute COVID-19 episode, or persist from the initial illness
38. Symptoms of the post-COVID-19 condition usually resolve after a while, although they may fluctuate or relapse over time
39. Symptoms of the post-COVID-19 condition can be present even 2 years after recovery from SARS-CoV-2 infection in up to 40% of survivors
40. It is of utmost importance to give proper attention and detailed information to persons who think that they suffer from the post-COVID-19 condition
41. As soon as the diagnosis related to the post-COVID-19 condition is given, patients need to be taken seriously and management should include not only medications and doctor's contacts but also additional treatments, like occupational therapy, physiotherapy, psychological support and support in social issues (especially professional re-integration, financial issues etc.)

Abbreviations: COVID-19, coronavirus 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

infection epidemiological and biological landscape, several other guidelines and recommendations on the management of the neurological conditions in the settings of the COVID-19 pandemic became available. However, they were mainly focused on specific neurological conditions, such as multiple sclerosis [30], neuromuscular disorders [31] and dementia [32], or they were country-specific and tailored to a specific health system (e.g., [33]). In addition, an increasing emphasis has been put on the post-COVID-19 neurological and behavioural sequelae [24, 34]. Although quite useful and informative concerning their targeted topics, all these guidance and statements do not meet the requirement for comprehensive and structured guidance on good clinical practice in patients with neurological disease faced with SARS-CoV-2 infection, which was the main goal set in the original EAN consensus statement from 2020.

However, since the publication of the 2020 Statement, the epidemiological situation as well as the clinical presentation of COVID-19 have changed substantially. At the same time, the understanding of the biology of the SARS-CoV-2 infection together with the skills and experience in the management of COVID-19 have increased considerably [35–37]. Therefore, a need for updated yet still comprehensive and structured recommendations has been recognized by the EANcore COVID-19 Task Force. In this 2024 update, the Task Force re-evaluated the original recommendations from the 2020 Statement, removed the recommendations that were found to be obsolete or not valid anymore, updated the others that were still valid, and added new recommendations for the areas of care for the people with neurological diseases that emerged over the last 3 years (such as vaccination and post-COVID-19 symptoms). This updated Statement is again structured into four sections, that is, recommendations for the treatment of neurological conditions, recommendations for patients with chronic neurological conditions, recommendations on COVID-19 vaccination and recommendations on post-COVID-19 conditions.

In the production of the updated Statement, besides the COVID-19 Task Force members, almost all Scientific and Core Panels of EAN were involved, thus ensuring that the recommendations given herewith reflect the experience and knowledge across various subspecialties of neurology.

With one exception, all the recommendations from the sections on the treatment of neurological conditions and on the patients with chronic neurological conditions have stood the test of time, although requiring updates. Moreover, the updated and new statements, developed through the first round of Task Force discussions, received overall support from the wider community of the members of the Managing Groups of the EAN SPs and Core Groups with none of the proposed statements rejected in the survey.

Some of the items in this updated statement are almost unchanged from the 2020 Statement due to their ongoing validity—for example, recommendation number 1 on the management of neurological conditions requiring intensive care unit admission. Some items required certain modifications and/or clarifications—for example, the recommendations on cell-depleting and immunosuppressive therapy, where the specification of drugs and drug types was made. The recommendation on the use of plasma exchange and intravenous immunoglobulin (item 9) was the most controversial one with a relatively high rate of suggestions to remove it, but with even twice as high a rate of suggestions to keep it unchanged. Obviously, this is an area where more data are needed to permit forming an unambiguous opinion. At this stage, a more cautious approach was favoured.

In developing this updated statement, particular attention was placed on the management of chronic neurological diseases in the event of a localized or more global increase in the SARS-CoV-2 infection. As has been stressed already, it seems that the continuous flow of endemic cases and localized epidemics of COVID-19 will be a challenge for years ahead [3–5].

An attempt was also made to clarify opinions about vaccination status and treatment effects. As the pandemic continues to lose steam, opinions about vaccines have begun to gain importance. There is an increasing number of publications addressing two aspects of this issue—under what conditions vaccinations for protection against COVID-19 can be administered and the rare neurological complications of vaccines (e.g., [27, 28, 38, 39]). The third group of recommendations of this consensus report was prepared to tackle this important question.

One of the most needed areas of this updated statement is the increasingly reported presence of various symptoms long after the resolution of the acute SARS-CoV-2 infection, the post-COVID condition. Recommendations were formulated about the clinical presentation and possible treatment approaches.

A limitation of this work that needs to be acknowledged is that the statements reflect primarily the opinions of the Task Force and SP and CP Management Group members. The consultation did not involve all EAN members and thus the results may be slightly biased. However, the SP and CP Management Group members as well as the Task Force members were elected by their peers as experts in the field.

Changing climate conditions, travel and migrations, wars and socioeconomic conditions unfortunately continue to create the environment that has facilitated the pandemic that has been experienced. The COVID-19 pandemic caught the healthcare and other systems by surprise. Lessons learnt from this pandemic should help us to react better and more quickly to future similar challenges, either by COVID or by some other agent, that is, to protect fragile populations, secure intensive care access for neurological emergencies, promptly establish surveillance programmes and ultimately promote herd immunity through vaccine immunization, which, in the setting of COVID-19, was pivotal to reduce COVID-19 disease severity and end the pandemic. As neurologists, it is important always to be ready for similar situations and update our knowledge and practices in the light of new scientific developments.

AUTHOR CONTRIBUTIONS

Saša R. Filipović: Conceptualization (lead); writing—original draft; methodology; writing—review and editing; investigation; formal analysis. Serefnur Özturk: Conceptualization (lead); writing—original draft; methodology; writing—review and editing; investigation; visualization. Daniel Bereczki: Conceptualization; writing—review and editing. Benedetta Bodini: Conceptualization; writing—review and editing. Francesco Cavallieri: Conceptualization; writing—review and editing. Alessandra Fanciulli: Conceptualization; writing—review and editing. Alla Guekht: Conceptualization; writing—review and editing. Raimund Helbok: Conceptualization; writing—review and editing. Sonja Hochmeister: Conceptualization; writing—review and editing. Filippo Martinelli Boneschi: Conceptualization; writing—review and editing. Alberto Priori: Conceptualization; writing—review and editing. Martin Rakusa: Conceptualization; writing—review and editing. Michele Romoli: Conceptualization; writing—review and editing. Barbara Willekens: Conceptualization; writing—review and editing. Marialuisa Zedde: Conceptualization; writing—review and editing. Johann Sellner: Conceptualization; writing—review and editing; supervision. Elena Moro: Conceptualization; writing—review and editing; supervision.

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CONFLICT OF INTEREST STATEMENT

No author reports a conflict of interest related to the content of this paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Filipović SR, Özturk S, Bereczki D, et al. Management of patients with neurological diseases considering post-pandemic coronavirus disease 2019 (COVID-19) related risks and dangers — An updated European Academy of Neurology consensus statement. *Eur J Neurol*. 2024;00:e16408. doi:10.1111/ene.16408