ISSN: 2754-4737

Journal of Neurology Research Reviews & Reports

SCIENTIFIC Research and Community

Review Article

Open Access

Satisfaction Rates on Telemedicine Consultations among Neurology Patients Seen at A Tertiary Hospital: A Cross- Sectional Study

Anna Ma. Gabrielle S. de Castro[1]* and Criscely L. Go[1,2]

[1]Department of Neurology, Jose R. Reyes Memorial Medical Center

[2]Department of Behavioral Medicine, Jose R. Reyes Memorial Medical Center

Abstract

Background: During the COVID-19 pandemic, there is an increase in demand of telemedicine for safer consultations to minimize potential exposure for both patient and healthcare providers. it is important to determine the patient satisfaction level to continuously improve this experience.

Methods: In this study, descriptive statistics using summary measures were used to describe the socio-demographic profiles of neurology patients who sought consultation through telemedicine in the Jose R. Reyes Memorial Medical Center, Department of Neurology from September 2021 to October 2021. T-tests and analysis of variance (ANOVA) were used to determine statistically significant differences between the type of visit and amongst the top four diagnosis seen, respectively.

Results: The respondents are composed of 54% females and 46% males with ages ranging from 19 to 83 years old. One-third of the respondents are new patients, and the rest are follow-up visits.

Conclusion: The t-test and ANOVA showed that there are no significant differences in the mean level of overall satisfaction between the type of visit (p-value = 0.9117) and among the top four diagnosis (p-value = 0.3371).

***Corresponding author**

Anna Ma. Gabrielle S. de Castro, Department of Neurology, Jose R. Reyes Memorial Medical Center, Rizal Avenue, Sta. Cruz, Manila, Metro Manila, Philippines. Tel: +63 943-4378660; Email: annasisondecastro@gmail.com

Received: January 08, 2022; **Accepted:** January 18, 2022; **Published:** January 25, 2022

Introduction

COVID-19 is a strain of novel coronavirus that was first reported from Wuhan, China which is highly infectious and spreads by means of respiratory droplets leading to severe respiratory illnesses such as severe pneumonia and eventual acute respiratory failure and death. Worldwide, about 37 million people have been affected, with 1 million deaths globally .

Due to the increasing trend of COVID 19 cases, there has been a drastic shift from face-to-face patient and physician interaction to telemedicine [1]. This is to avoid and minimize physical interaction amongst high-risk populations such as those older than 65 years old, younger than 18 years old, and those who have chronic illnesses such as bronchial asthma, immunodeficiency and chronic pulmonary diseases [2].

According to the World Health Organization (2010), telemedicine is defined as "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities" [3]. While Teleconsultation refers more specifically to the consultations done using telecommunications, with the purpose of diagnosing and treating patients despite being remote from the patient or physician [4, 5]. Despite its benefits, telemedicine has the following limitation: (1) the lack of knowledge of the patient to use various technologies for their teleconsultation, (2) the inability of the physician to perform a thorough physical examination, and (3) geographical internet access.

As of this study, there are no papers looking into satisfaction rates in telemedicine amongst Neurology patients in the Philippines.

Objectives of the Study

The main objective of this study is to evaluate the satisfaction rate among neurology patients on the use of telemedicine consultation at Jose R. Reyes Memorial Medical Center during the COVID 19 pandemic. Specifically,

1. To determine the socio demographic profile of the patients.
2. To summarize the level of satisfaction through telemedicine specifically.

a) Interpersonal complacency of telemedicine provider and patients utilizing video technology,

b) Patients' comfort with video technology and Internet access,
3. Preference of telemedicine over a regular in-person visit.
4. To compare the overall satisfaction by visit type (follow up and new patient) and amongst different diagnosis.
5. To describe the disposition after telemedicine care.

Review of Related Literature

COVID – 19

Severe acute respiratory syndrome – coronavirus 2 (SARS-CoV-2) is the strain of novel coronavirus that is responsible for the COVID 19 2020 pandemic. According to the World Health Organization (WHO), most people infected with COVID-19 will present with mild to moderate respiratory illnesses that do not require medical attention. However, those who are older and with underlying medical problems like hypertension, diabetes, chronic respiratory illnesses, and immunocompromised are likely to develop the severe and critical type of illness. It was first detected in Wuhan, Hubei province, China last December 2019 and was initially linked to Huanan Seafood Wholesale Market [6]. First cases were admitted as having acute respiratory distress syndrome (ARDS) and was noted to have rapidly spread within the hospital by person-to-person transmission primarily via direct contact or through droplets spread by coughing or sneezing of an infected individual.

To date, WHO reports that there are 114,653,749 confirmed cases of COVID-19 globally. This includes 2,550,500 deaths. Meanwhile, in the Philippines, the Department of Health has recorded a total of 582, 223 COVID-19 cases, of which 35,056 of the cases remain active. It was only with the first COVID-19 confirmed case in the United States that Holshue et.al. did a case report that led to its initial description, identification, diagnosis, clinical course, and management [6].

At the time of this writing, there are no specific anti-viral drugs against COVID-19 infection for potential therapy for humans. The only Food and Drug Administration (FDA) approved drug for the treatment of COVID-19 is Remdesivir with or without dexamethasone. Two vaccines are currently authorized and recommended for the prevention of COVID-19: Pfizer-BioNTech COVID-19 Vaccine and Moderna's COVID-19 Vaccine. According to the Centers for Disease Control and Prevention (CDC) there are three other vaccines currently on Phase 3 clinical trials: AstraZeneca's COVID-19 vaccine, Jannsen's COVID-19 vaccine, and Novavax's COVID-19 vaccine. Currently, several countries have started vaccination programs using vaccines provided by Pfizer, Astrazeneca, Moderna, Johnsons and Johnsons, and Sinovac.

However, since there is still limited supply of vaccines, the best way to prevent the spread of COVID-19 is still knowledge on how it is acquired (i.e., respiratory droplets from an infected individual) and prevention such as through proper hand hygiene and self-isolation of infected individuals or those who are considered high-risk population (i.e., elderly, and immunocompromised) to slow down its transmission.

COVID-19 Effects on Nervous System

Several neurological abnormalities have been identified in patients infected with COVID-19. Neurological abnormalities involving the central and peripheral nervous system have been described in 30% of patients who required hospitalization for COVID-19, 45% of those with severe respiratory illness and 85% of those with ARDS5. In a study conducted by Mao et al., 2020, patients with mild COVID-19 infection presented with mostly nonspecific neurological symptoms such as malaise, dizziness, headache, and loss of smell and taste [7].

More serious neurological complications include encephalopathy and stroke. An article by Iadecola et al., stated that there were reports of COVID-19 patients who met the criteria for infectious encephalitis [8]. These patients allegedly presented with altered mental status, fever, seizures, white blood cells in the CSF, and focal brain abnormalities on neuroimaging [9]. In at least two reported cases, SARS-CoV-2 was detected in the CSF [10-12]. In at least 1 COVID-19 case, the diagnosis of temporal lobe encephalitis was confirmed by biopsy that showed perivascular lymphocytic infiltrates and hypoxic neuronal damage [13]. However, there was no documented presence of SARS-CoV2 or other viruses in brain or CSF in said case. Delirium, confusional states, and coma appear most common in COVID-19-related critical illness [14,15].

Stroke is also common among patients hospitalized with COVID-19, with reported rates ranging from 1%–3% in hospitalized patients and up to 6% of critically ill patients [14, 16, 17] Infections in general increases the risk of stroke, hence there is likely that SARS-CoV-2 infection does play some role in causing stroke. In addition, stroke may also be attributed to hypercoagulability related to COVID-19 infection,as reported in an autopsy series in which widespread microthrombi and patches of infarction were observed some brains [18].

Telemedicine

Telemedicine is defined as the use of technology to provide a cost-effective mean in delivering health care to patients who are living in remote geographically isolated areas and to limit the exposure of high-risk patients such as the elderly or those with other underlying health conditions to the acutely ill and potentially infectious individual [2]. Even before the time of COVID-19, telemedicine has already been adopted by several countries to bring palliative care to the seriously ill. In the Philippines, telemedicine was introduced in 1998 by the National Telehealth Center (NTC) under the National Telemedicine Service Project. This project aimed to link specialist from the Philippine General Hospital (PGH) to trained rural physicians by means of e-mail or the use of short message service (SMS) to refer cases for further evaluation and management [19].

According to the annual survey of the National Telehealth Center (NTC) done in 2013, telemedicine's uptake in the Philippines has been slow receiving only 1 to 2 referrals per week with only 20 to 30 actively referring physicians using the platform [2]. The care of patients with serious illnesses now requires strict social-distancing to protect themselves and the health care workers who are needed in response to COVID-19. Hence, the use of telemedicine has drastically increased and has become an essential platform to lessen and slow down the spread of the disease and to avoid overwhelming our health care system in treating the high-risk population and infectious patients [20].

Calton et.al. listed several communication tools which are low-cost or free for telemedicine use, this included the following: Apple's Facetime, Facebook messenger and video chat, Google hang-out video and Skype [21, 22]. In their report they also identified several factors for a patient to access the telemedicine service such as a computer, tablet, or smartphone capable of doing videocalls and a stable internet connection.

In the Philippines, it was noted in a previous study done in 2013 that the preferred method was through the use of mobile phones due to its availability and fast access [23]. Though in many rural areas, acquiring mobile phones and internet access remains as a problem and remains as the single most important factor of underutilization of telemedicine [2]. Another factor that some studies showed was that patient's satisfaction with telemedicine is greatly influenced by their age and socioeconomic status, wherein those who are from the older age group were less likely to be adept to using the internet and those who has a lower income have no internet access [22].

Telemedicine in Neurology and Patient Satisfaction

There are reasons why the use of telemedicine exists: first, is to deliver health care services, when practicing medicine is impossible; second, for continuing education of health care providers, in all interest of advancing the health of individuals and their communities, and lastly, if there are distinct advantages of using telemedicine over traditional face-to-face medicine. During the COVID-19 pandemic, these reasons have been thrust into the limelight as there are restrictions, resulting in limited to almost impossible patient face-to-face consultations [9].

The lack of timely access to health care worldwide, particularly in the population with disability, such as neurological patients. Thus, tele-neurology interventions are being implemented and evaluated in some regions of the world [24]. Several have started using various types of telemedicine to manage their patients, such as real time or synchronous via telephone, video call, video conferences with far-end camera control and an assistant with the patient to perform examination; and on store-forward or asynchronous using email, webserver, and smartphone applications.

Although telemedicine can address the issue of timely access to health care, it is possible that this type of interventions can adversely impact on the quality of the specialist's relationship with his patient.

A study by Contanzo et al., indicated that telemedicine interventions do not hinder the development of the link between the patient and his/her specialist doctor, with high patient satisfaction [24]. However, no definitive conclusions should be drawn regarding the quality of care of patients.

Another article done by Kruse et al., 2017, stated that patient satisfaction can be associated with the modality of telehealth, but factors of effectiveness and efficiency are mixed [25]. It also revealed that patients' expectations were met when providers delivered healthcare via videoconference or any other telehealth method.

Methodology

Sampling Methods and Design

The study is a quantitative, descriptive, and cross-sectional study. The scope of the study is at Jose R. Reyes Memorial Medical Center, Department of Neurology from September 2021 to October 2021. Technical and Ethical approval were obtained from governing authorities prior to conduct of the study.

In addition to this, consent form was given to the respondents highlighting confidentiality and anonymity. The link for the survey questionnaire is provided to the respondents after their consultation to get their response. The questionnaires were accomplished through google forms with 5 Lickert scale questions adapted from the study published by Yoon et.al. Answers ranges from 1 being the lowest satisfaction level and 5 being the highest satisfaction level. Lastly, the researcher is responsible for the accuracy of raw data, and a third party is necessary if doubts exist.

Sampling was done randomly among the representative sample size who sought consult through telemedicine the previous year. Sampling was completed in a span of two months during the year 2021.

Sample Size Computation

Sample size was calculated using the OpenEpi program. The anticipated % frequency (p) is 50. Confidence limits as +/- percent of the 100 is 5. The design effect used is 1.0. The total population will be 749 as the total neurology patients of Jose R. Reyes Memorial Medical Center who sought consult through telemedicine during the year 2020. Based on the OpenEpi computation, sample size with a 95% confidence interval will be 254.

Study Subjects

The study included neurology patients who sought consultation through telemedicine provided by the Department of Neurology with the following inclusion criterias: (1) must be literate, and (2) has access to a smart device (e.g., computer or smart phone) and (3) internet connection that will allow them to undergo the teleconsultation and answer the online survey questionnaire via google forms.

Statistical Analysis Plan

Initial coding of the gathered data will be done through Microsoft Excel. Statistical analyses were computed in R software, an open-source statistical software. Descriptive and inferential statistics was done in this study in order to answer the research questions. The following statistical treatments were used in the study: (1) Frequency distribution and percentage was used to determine the socio demographic profile of the patients according to age, gender, diagnosis, visit type and disposition; (2) Summary statistics was used to determine the level of satisfaction; (3) t-test using independent samples and analysis of variance (ANOVA) was used to determine the significant difference between the level of satisfaction of patients when grouped according to visit type and diagnosis respectively; (4) Frequency distribution was used to describe the disposition at the telemedicine.

Ethical Consideration

This study was conducted in agreement with the Declaration of Helsinki. It was conducted according to the ICH Harmonized Tripartite Guideline for Good Clinical Practice. The protocol was approved by the local Research Ethics Committee of Jose R. Reyes Memorial Medical Center in accordance with national guidelines and legislation in the participating center.

The patient's privacy was ensured, they were assigned a sequential identification number throughout the study. However, initials and birthdate were recorded at the start of the study to avoid errors.

Electronic informed consent was mandatory and was included at the start of the study, it was translated to the patient's native language and was explained by the attending physician conducting the research. It was further explained that it is strictly voluntary, and they may refuse anytime.

Results and Discussion

There are 254 respondents who answered the survey in this study. All of them participated positively and completed the survey. To

understand the characteristic of the respondents, their demographic profiles are gathered and discussed. Descriptive statistics were derived and shown in the table below. Based on Table 1 below, there are 54% (n=137) and 46% (n=117) for females and males respectively who participated in the study.

Table 1: Frequency and Percentage Distribution of Respondents Per Sex

Sex	Frequency	Percentage
Female	137	53.94%
Male	117	46.06%
Total	254	100.00%

According to Table 2, most of the respondents are at most 30 years of age which is 30% of the total respondents. The age brackets 31-40, 41-50, and 51-60 have almost the same frequency which is more than 40. On the other hand, the age bracket with the least number of respondents is above 70 years old.

Table 2: Frequency and Percentage Distribution of Respondents Per Age Group

Age in years	Frequency	Percentage
<= 30	78	30.71%
31 to 40	41	16.14%
41 to 50	43	16.93%
51 to 60	48	18.90%
61 to 70	29	11.42%
>70	15	5.91%
Grand Total	254	100.00%

Based on the responses, there are two types of visits, these are Follow up and new patient visits. As shown in Table 3, about one-third or 33% (n=86) of the respondents are new patients and twice of this, 66% (n=168) are follow up visits.

Table 3: Frequency and Percentage Distribution of Respondents Per Visit Type

Type of visit	Frequency	Percentage
Follow up	168	66.14%
New patient	86	33.86%
Total	254	100.00%

Among all 254 respondents, there are 24 different diagnosis, and the distribution of the most common diagnosis is summarized in Table 4. Stroke and seizure disorder are the most common diagnosis which accounted to 96 consultations each, composing 88% in total of all diagnosis. The next frequent diagnosis are intracranial mass and migraine which is 6% and 5% respectively. The remaining 20 diagnoses which are anxiety disorder, bacterial meningitis, bell's palsy, brain abscess, cerebral aneurysm, dementia, dystonia, headache, medical, movement disorder, myasthenia gravis, neurofibromatosis, Parkinson disease, primary insomnia, sciatica, spinal cord compression, TB meningitis, trigeminal neuralgia, tuberculoma, and vertigo have frequencies ranging from 1 to 4 only.

Table 4: Frequency and Percentage Distribution of The Top Four Diagnosis

Diagnosis	Frequency	Percentage
Stroke	96	44.24%
Seizure Disorder	96	44.24%
Intracranial Mass	14	6.45%
Migraine	11	5.07%
Total	217	100.00%

Participants were also asked for their level of satisfaction about the telemedicine in terms of interpersonal complacency of telemedicine provider and patients utilizing video technology, patients' comfort with video technology and Internet access, and preference of a regular in-person visit. To describe the data gathered in the level of satisfaction, some summary statistics are shown in Table 5. Based on this, the mean overall satisfaction of the respondents is relatively high which is 4.24 and only deviates by 0.94. This means that the overall level of satisfaction is relatively close to each other. In terms of interpersonal complacency of telemedicine provider and patients utilizing video technology and patients' comfort with video technology and Internet access, both have the same mean of 4.28 but the latter one has a higher deviation of 1.11 which means that the level of satisfaction in the latter is more dispersed than the former one. Lastly, preference of Telemedicine over regular in-person visit has the lowest mean rating which is 4.13 and deviates by 1.09.

Table 5: Summary Statistics of The Level of Satisfaction of The Respondents

Variable	Mean	Standard Deviation
Overall satisfaction	4.24	0.94
a. interpersonal complacency of telemedicine provider and patients utilizing video technology	4.28	0.94
b. patients' comfort with video technology and Internet access	4.28	1.11
c. preference of telemedicine over a regular in-person visit	4.13	1.09

Using the overall satisfaction as a response variable, a t-test on two independent samples was used to determine if there is a difference in the mean overall level of satisfaction between type of visit (follow up and new patient). Using the R software for a t-test, the p-value generated is 0.9117. Since the p-value is greater than alpha, we fail to reject the hypothesis that they are equal. In conclusion, at alpha, level of significance equal to 0.05, there is no sufficient evidence to say that the mean level of satisfaction on follow up patients is different to new patients.

Moreover, an analysis of variance (ANOVA) was used to determine if there are differences in the mean level of satisfaction between the top four diagnosis. Based on the output below, Table 6, from the R software, the p-value, 0.3371, is greater than the level of significance, 0.05. This means that there are no significant differences in the mean level of satisfaction among the top four diagnosis.

Table 6: ANOVA of the Level of Satisfaction Among the Top Four Diagnosis

SUMMARY

Groups	Count	Sum	Average	Variance
Intracranial Mass	14	63.125	4.508929	0.328039
Migraine	11	46.75	4.25	0.478125
Seizure Disorder	96	398.75	4.153646	1.248184
Stroke	96	418	4.354167	0.494298

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.783353	3	0.927784	1.131953	0.337075	2.646988
Within Groups	174.5816	213	0.819632			
Total	177.3649	216				

As for the disposition, based on the respondents in Table 7, more than half of them, 53% has prescription as their disposition. This is followed by follow up scheduled with 53 counts which is about 21% of the respondents. There are very few respondents who are disposed as return as needed, disability papers, and direct admission to ER.

Table 7: Frequency and Percentage Distribution of Respondents Per Disposition

Disposition	Frequency	Percentage
Prescription	136	53.54%
Follow up scheduled	53	20.87%
Neuroimaging requested	40	15.75%
Referral given	20	7.87%
Return as needed	2	0.79%
Disability Papers	2	0.79%
Direct admission to ER	1	0.39%
Total	254	100.00%

Conclusion

The main objective of this study is to evaluate the satisfaction rate among neurology patients on the use of telemedicine consultation at Jose R. Reyes Memorial Medical Center during the COVID 19 pandemic. The instrument used in order to measure the satisfaction rate is a survey questionnaire. A total of 254 respondents who are patients of the neurology department answered the survey regarding telemedicine. The data collected were tabulated and summarized using Microsoft Excel and Rstudio.

After the data management, the profile and answers of the patients were analyzed. The data showed that majority of the respondents are female or at most 30 years old. Only 15 patients in the neurological department were more than 70 years old. Most of the patients were regulars and scheduled their appointment for follow-up (66.14%) checkup. The top frequent diagnosis for the neurology patients are stroke (44.24%), seizure disorder (44.24%), intracranial mass (6.45%) and migraine (5.07%).

In terms of the neurology patients' satisfaction level for their telemedicine appointment, overall, there is a relatively high satisfaction rate of 4.24. This means that the neurology patients are satisfied in different aspects of telemedicine defined in this study during COVID-19 pandemic. For the specifics, there is higher satisfaction level in terms of interpersonal complacency of telemedicine provider and patients utilizing video technology, patients' comfort with video technology and internet access than the preference of telemedicine over a regular in-person visit. Although, the satisfaction level of the preference of telemedicine over a regular in-person visit is lower than the other aspects pointed out, it is still relatively high.

For the differences in satisfaction level, there is an equal level of satisfaction level for both new patient and a follow-up patient. Moreover, there is also no differences in the level of satisfaction for the different diagnosis of the neurology patients. Thus, this means that the neurology patients regardless of type of visit and diagnosis have relatively high level of satisfaction. As for the disposition, majority of the patients received prescriptions for their diagnosis, and some have follow up scheduled [26-29].

All in all, the study showed that the neurology patients have relatively high level of satisfaction. The type of patient visit and diagnosis of the patient does not affect the level of satisfaction of the neurology patients with regards to telemedicine during the pandemic.

Disclosure

There was no personal interaction involved between the researcher and the patient. Therefore, there are no anticipated risks and no payment given during this research.

Sources of Support: Not applicable

Conflict of Interest: No competing interest declared by the authors.

References

1. Basu A, Chakraborty S (2020) Faculty opinions recommendation of Neurologic manifestations of hospitalized patients with CORONAVIRUS disease 2019 in wuhan, china. Faculty Opinions – Post-Publication Peer Review of the Biomedical Literature. doi:10.3410/f.737716439.793575065.
2. Pasco PM (2016) Physician User Perspectives in the Practice of Telemedicine in the. J Int Soc Telemed ehealth 4: 1-9.
3. World Health Organization (2010) Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth. Document Version 2: 18-20.
4. Deldar K, Bahaadinbeigy K, Tara S (2016) Teleconsultation and Clinical Decision Making: a Systematic Review. ACTA INFORM MED 24: 286-292.
5. World Medical Association. (2018) World Medical Association. From WMA STATEMENT ON THE ETHICS OF TELE.
6. Rothan HA, Byrareddy SN (2020) The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun 109:102433.
7. Mao L, Jin H, Wang M, Hu Y, Chen S, et al. (2020) Neurologic manifestations of hospitalized patients With Coronavirus DISEASE 2019 IN WUHAN, CHINA. JAMA Neurology 77: 683-690.
8. Costantino Iadecola, Josef Anrather, Hooman Kamel, Effects of COVID-19 on the Nervous System, Cell 183: 16-27.
9. Venkatesan A, Tunkel AR, Bloch KC, Lauring AS, Sejvar J, et al. (2013) International Encephalitis Consortium (2013). Case definitions, diagnostic algorithms, and priorities in encephalitis: consensus statement of the international encephalitis consortium. Clin. Infect. Dis 57: 1114-1128.
10. Huang C, Wang Y, Li X, Ren L, Zhao J, et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 395, 497–506.
11. Huang YH, Jiang D, Huang JT (2020) SARS-CoV-2 Detected in Cerebrospinal Fluid by PCR in a Case of COVID-19 Encephalitis. Brain Behav. Immun 87: 149.
12. Moriguchi T, Harii N, Goto J, Harada D, Sugawara H, et al. (2020) A first case of meningitis/encephalitis associated with SARS-Coronavirus-2. Int. J. Infect. Dis 94: 55-58.
13. Ibrahim E Efe, Orhun Utku Aydin, Alper Alabulut, Ozgur Celik, Kerameddin Aydin (2020) COVID-19−Associated Encephalitis Mimicking Glial Tumor, World Neurosurgery, 140: 46-48.
14. Mao L, Jin H, Wang M, Hu Y, Chen S, et al. (2020) Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol 77: 1-9.
15. Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, et al. (2020) Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. Lancet Psychiatry 7: 611-627.
16. Merkler AE, Parikh NS, Mir S, Gupta A, Kamel H, et al. (2020) Risk of Ischemic Stroke in Patients With Coronavirus Disease 2019 (COVID-19) vs Patients With Influenza. JAMA Neurol. Published online July 77: 1366-1372.
17. Ishida KS, Torres J, Mac Grory B, Raz E, Humbert K, et al. (2020) SARS-CoV-2 and Stroke in a New York Healthcare System. Stroke 51: 2002-2011.
18. Bryce C, Grimes Z, Pujadas E, Ahuja S, Beasley MB, et al. (2020) Pathophysiology of SARS-CoV-2: targeting of endothelial cells renders a complex disease with thrombotic microangiopathy and aberrant immune response. The Mount Sinai COVID-19 autopsy experience. medRxiv. https://doi.org/10.1101/2020.05.18. 20099960.
19. Constanzo F, Aracena-Sherck P, Hidalgo JP (2019) Validation of a patient satisfaction survey of the Teleneurology program in Chile. BMC Res Notes 12, 359 (2019). https://doi.org/10.1186/s13104-019-4358-1.
20. Portnoy J, Waller M, Elliott T (2020) Telemedicine in the Era of COVID-19. J Allergy Clin Immunol Pract 8: 1489-1491.
21. Calton B, Abedini N, Fratkin M (2020) Telemedicine in the Time of Coronavirus. J Pain Symptom Manage 60: e12-e14.
22. Yoon EJ, Tong D, Anton GM (2021) Patient Satisfaction with Neurosurgery Telemedicine Visits During the Coronavirus Disease 2019 Pandemic: A Prospective Cohort Study. World Neurosurg 145: e184-e191.
23. Macrohon BC, Cristobal FL (2013) The Effect on Patient and Health Provider Satisfaction regarding Health Care Delivery using the Teleconsultation Program of the Ateneo de Zamboanga University-School of Medicine (ADZU-SOM) in Rural Western Mindanao 47: 18-22.
24. Parsons T, Banks S, Bae C, Gelber J, Alahmadi H, et al. (2020) COVID-19-associated acute disseminated encephalomyelitis (ADEM). J. Neurol 267: 2799-2802.
25. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, et al. (2017) Telehealth and Patient satisfaction: A systematic review and narrative analysis. BMJ Open 7: e016242.
26. Lofy KH, Wiesman J, Bruce H (2020) First Case of 2019 Novel Coronavirus in the United States. Published online 2020: 1-9.
27. Guidelines T (2019) Coronavirus Disease 2019 (COVID-19) Treatment Guidelines.
28. Merad M, Martin JC (2020) Pathological inflammation in patients with COVID-19: a key role for monocytes and macrophages. Nat. Rev. Immunol 20: 355-362.
29. Wang D, Hu B, Hu C, Zhu F, Liu X, et al. (2020) Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan. JAMA 323: 1061-1069.