Telemedicine for Neurological Consultations in Nepal

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Abstract

Introduction: Telemedicine is a method of using a variety of telecommunication techniques to evaluate patients. This research was carried out to study the clinical and demographic characteristics of the patients who sought neurological care via telemedicine during the first and second waves of the coronavirus disease 2019 pandemic.

Methods and Materials: It is a retrospective study based on patients' records. Patients were consulted via Viber, WhatsApp, Facebook Messenger and telehealth facility of Danphe Care. The data were entered into and analyzed by using the Statistical Package for the Social Sciences version 26.

Results: A total of 197 patients were examined. Viber was the most common tool used (n=109, 55.3%). One hundred and twenty-two patients (61.9%) were from outside the Kathmandu Valley. Majority of the patients (n=155, 78.7%) did not come across any technical disturbances during the consultation. Cerebrovascular diseases were the most common diseases evaluated followed by headache disorders and seizures. One hundred and thirty-seven patients (69.5%) did not require further investigations, 179 (90.9%) did not require in-person evaluations and 142 (72.1%) did not require referral to other specialists for further evaluation. Majority (54.3%) of the patients became better at follow-up. All patients who became better had at least one follow-up compared to 82.2% of the combined who remained static or had unknown status of their health in follow up (p = <0.001).

Conclusion: Telemedicine is a useful tool to evaluate various neurological disorders. Even though most of the patients did not require investigations, referrals and in-person visits, majority of the patients improved. Patients who have at least one follow-up became better compared to patients who did not have any follow-ups.

Key words: Nepal; neurology; telemedicine.

Introduction

Telemedicine is a method of using a variety of telecommunication techniques to evaluate patients. Telemedicine can be safely used to take history, examine patents, review investigations and provide treatment with good doctor-patient relationship still maintained even when the patients and doctors are physically separated.[1] It is considered a very powerful and state-of-the-art technique to provide neurology services in remote areas which is of utmost importance in countries like Nepal.[2,3] There is evidence that using telehealth in neurology maintains high patient satisfaction and is very cost-effective, hence, the American Academy of Neurology has endorsed telemedicine as an effective and reliable method of neurological consultation.[4] This research was carried out to study the clinical and demographic characteristics of the patients who sought neurological care via telemedicine during the first and second waves of the coronavirus disease 2019 (COVID-19) pandemic. We also studied if there were any associations between the number of follow-ups, the need for investigations, the need for referrals and the need for in-person review and outcome of patients managed with telemedicine.

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Methods and Materials

This is a retrospective observational study based on patients' records kept by the first author during the first and the second waves of the COVID-19 pandemic (April 2020 till October 2021). Patients with various neurological disorders were consulted via Viber, WhatsApp, Facebook Messenger and telehealth facility of Danphe Care during

that period. The evaluations were done via video calls by taking history and carrying out the examination. Examination was done by observing the response of the patients to the primary author's commands. The functions of the olfactory nerve, ophthalmoscopic examination, full examination of muscle power, examination of reflexes, plantar responses and detailed sensory examination were not possible. Patients who needed detailed evaluation were advised for in-person visits. The details were written in a prescription paper and were sent to the patients. The papers were deleted at later date. Patients who were advised to visit the emergency department because of acute conditions were not included in the study. Data collection was done by using self-designed proforma. The variables that were studied were age, sex, address, diagnosis, follow ups, referral for in-person evaluations, need for investigations, need for in person visits and outcome. The diseases were classified based on the 11th revision of the International Classification of Diseases.[5] The data were entered into and analyzed by using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics in the form of frequencies, percentages, mean, medians and standard deviations were used to describe the data. Chi-square test was used to calculate the significance between variables when applicable. The permission to conduct the study was obtained from the Institutional Review Committee of the Institute of Medicine [Reference number 161 (6-11) E2 078/079].

Results

A total of 197 patients were examined via telemedicine during the first and the second waves of the COVID-19 pandemic. Sixteen patients (8.1%) did not follow up subsequently, 32 (16.2%) had a single follow up, 75 (38.1%) of them had two follow-ups, 62 (31.5%) had three follow ups and 12 (6.1%) had more than three follow ups. The residences of the patients were as shown in figure 1.

The mean age of the patients was 49 years (14-98 years, standard deviation 19.7 years). Male patients numbered 103 (52.3%) and females 94 (47.7%). The majority of the patients were examined via Viber (n=109, 55.3%) followed by WhatsApp (n=52, 26.4%), Facebook Messenger (n=32, 16.2%) and telehealth facility of Danphe Care (n=4; 2%). Majority of the patients (n=155, 78.7%) did not come across any technical disturbances during the consultation process. The frequency of various diseases evaluated was as given in table 1.

Among cerebrovascular diseases, there were 24 cases of ischemic stroke, 18 cases of primary intracerebral hemorrhage, nine cases of transient ischemic attacks and four cases of cerebral venous sinus thrombosis. Among headache disorders, there were 27 cases of migraine, 13 cases of tension type headache, three cases of medication overuse headache, two cases of trigeminal neuralgia, two cases of temporal arteritis, two cases of cluster headache and one case of hemicrania continua. Among mental, behavioural or neurodevelopmental disorders, there were seven each of generalized anxiety disorder and bodily distress disorder. In case of disorders of nerve root, plexus or peripheral nerves, there were five cases of carpal tunnel syndrome, three cases of Guillain Barre Syndrome and one case of chronic inflammatory demyelinating neuropathy. All cases of movement disorders were Parkinson disease. All cases of disorders with neurocognitive impairment were unspecified dementias and all cases of infections of the central nervous system infections were unspecified meningitis. Further classification of seizures and diseases of musculoskeletal system could not be done as these were not clarified in the records.

The outcomes of the patients evaluated by telemedicine were as shown in figure 2.

The associations of various factors with the outcomes of the diseases are as shown in the table 2.

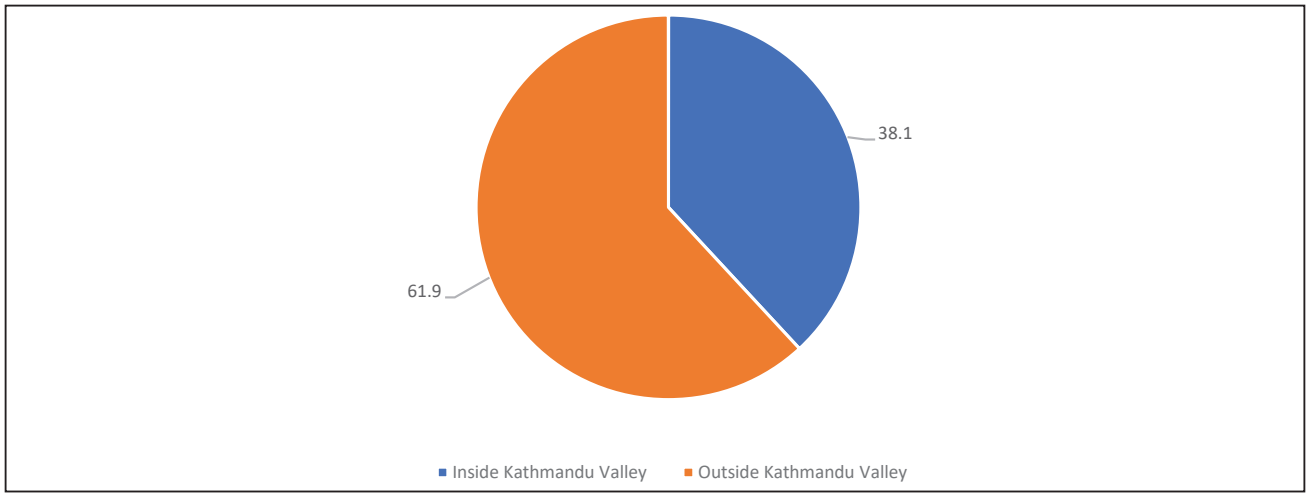

Figure 1: Residence of the patients evaluated.

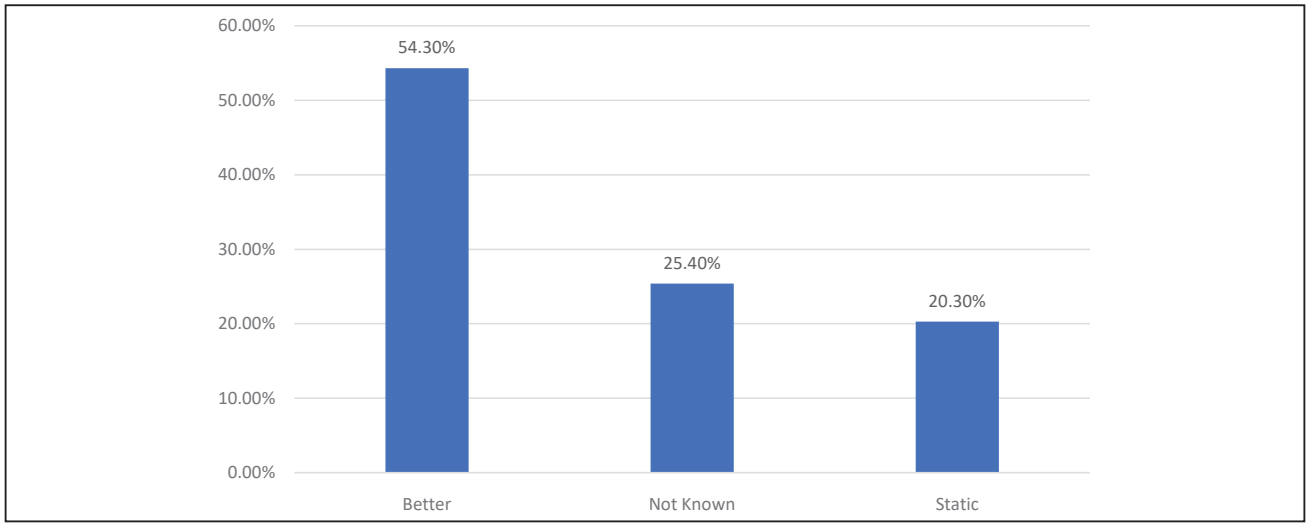

Figure 2: Outcomes of various patients evaluated.

Diseases	Frequency	Percentage
Cerebrovascular diseases	55	27.9
Headache disorders	50	25.4
Seizures	25	12.7
Mental, behavioural or neurodevelopmental disorders	14	7.1
Diseases of musculoskeletal system	12	6.1
Movement disorders	11	5.6
Disorders with neurocognitive impairment	10	5.1
Disorders of nerve root, plexus or peripheral nerves	9	4.6
Diseases of the inner ear	6	3
Infections of the central nervous system	5	2.5
Total	**197**	**100**

Table 1: Distribution of the various diseases evaluated.

Variables		Outcomes			P-Value (Chi-Square Test)
		Better	Not Known	Static	
Presence of technical difficulties	Yes	23	10	9	0.957
	No	84	40	31	
Inside Valley	Yes	39	20	16	0.877
	No	68	30	24	
Required further investigations	Yes	40	12	8	0.065
	No	67	38	32	
Referral Required	Yes	28	18	9	0.306
	No	79	32	31	
Two or more follow ups done	Yes	100	15	34	< 0.001
	No	7	35	6	
At least one follow-up done[a]	Yes	107	74		< 0.001
	No	0	16		
In-person evaluation required[a]	Yes	10	8		0.912
	No	97	82		
Total		**107**	**90**		

[a] *'Not Known' and 'Static' cells combined for this variable because the individual cells did not meet the minimum required counts to compute the p-Value.*

Table 2: Associations of various factors with the outcomes of the diseases.

Discussion

Telemedicine is a very underutilized tool in neurology.[6] It can be of greatest benefit to a country like ours where most people live in remote areas which pose great challenges during travel. In our study, 61.9% of the patients resided in areas outside Kathmandu Valley (Figure 1). Still, there is a lot of evidence that clinical details of the patients and their investigations can be reliably transmitted via telemedicine.[6] In this study, even though majority of the patients lived in remote areas, 78.7% did not come across any technical disturbances during the consultation process. This suggests that telemedicine can be reliably used to evaluate and manage patients in remote areas.

It can be seen from Table 1 that a variety of cases could be evaluated with telemedicine during the pandemic. Current evidence supports telemedicine can be used as a tool to evaluate and manage patients suffering from many neurological illnesses.[7] Most of the publications in teleneurology have been in stroke as stroke care has utilized the maximum potential of telemedicine.[8] Patients can be reliably evaluated, stroke related examination can be reliably carried out, eligibility for intravenous thrombolysis and thrombectomy can be reliably checked and outcome can be improved by using telemedicine.[9] Another field in neurology where telemedicine has a great potential is epilepsy and it is more so in low- and middle-income countries like ours.[6,10] In resource limited countries, most people are not on treatment either because appropriate physicians are not available near them or the logistics to maintain adequate drug supply is not present.[10] Telemedicine is also a useful tool to manage patients with headaches.[11] There is a growing literature on the use of telemedicine in diagnosis and management of movement disorders, the most commonly use has been with patients having Parkinson's disease and patients with hyperkinetic movement disorders.[12] It has also been used to support non-specialist service providers in remote less privileged areas.[12] Similarly, the usefulness of telemedicine has been extended to polyneuropathy, rehabilitation and intensive care.[1,13,14]

Most patients (54.3%) who were evaluated in our study became better with treatment and follow-up (Figure 2). Almost 20.3% of the patients remained static. The status of the remaining 25.4% of the patients was not known because of lack of regular or no follow-ups. It can also be seen in Table 2 that 137 patients (69.5%) did not need further investigations, 179 (90.9%) did not require in-person evaluations and 142 (72.1%) did not require referral to other specialists for further evaluation. However, the needs for further investigations, in-person visits and referrals in the patients did not have any associations with their outcomes (Table 2). The only factors associated with outcomes of the patients were the numbers of follow-ups the patients had. It can be seen in Table 2 that patients who had at least two or more follow-ups had either improved or remained static, and that patients who improved had at least one or more follow-up compared to other two groups combined. This is obvious as regular follow-ups can change management plans and can make the patients better, although our study did not address whether the follow-ups were associated with change in treatments in patients who improved compared to others who did not. Follow up regularly via telemedicine, thus, can improve outcome in neurological disorders. This can be very important in countries like ours where many patients must spend a lot of time and money to seek care due to long travel times to meet experts.

This study has several limitations. This is a very small study with only 197 patients. In a country with a 30 million population and only a handful of neurologists, this is almost a negligible number of patients. However, this study is the first study of this kind in this country and shows that evaluation and management of patients with neurological disorders through telemedicine is easy and reliable with improved outcomes. Another important limitation is the retrospective nature of the study with its inherent limitations. This study was not pre-planned. The data were extracted from the records kept by the first author. The status of patients who did not follow up is not known as contact information of the patients were not kept. Patients were advised treatment only if they sought care. Similarly, the status of the patients who remained static was also not known. The patients did not follow up via telemedicine after the second wave was over and it is not known whether the patients turned up for in-person visits at later dates. A large prospective study can refine data so that detailed analysis can be done and is highly desirable in our setting. Evidence from large study in our set up can help create centers in various provinces in Nepal where experts can be made available for telehealth services round the clock to assist physicians working in remote areas of Nepal. This can decrease travel times and costs to the patients, families can stay near the patient in the locality itself and medical emergencies can be tackled in the remote areas themselves as travel could cost lives because experts are usually out of easy reach in most areas of Nepal, saving time, cost and lives.[6]

Conclusion

With the findings above we can conclude that telemedicine can be used to evaluate patients with various neurological disorders. Majority of patients improved even when they did not require investigations, referrals and in-person visits. The only patient related factor which had association with outcome was the number of follow ups, patients having at least one follow-up had more chance of getting better than otherwise.

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