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Review Article

Telemedicine in Pediatric Neurology Clinic during the COVID Era and the Inherent Challenges -

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ABSTRACT

The ongoing COVID-19 challenge has upset the social, economic and health care system around the globe. Because of this pandemic, social distancing measures have been strictly implemented creating a profound stress on health care services. Telemedicine is an advancing and a timesaving means for emergency as well as non-urgent patient assessment. In this pandemic era, telemedicine has provided humanity with an alternative tool for provision of suitable clinical care within the short and safe therapeutic time window.

Telemedicine can be defined as “the implementation of telecommunication technologies to dispense medical information and services” and “the exercise by which electronic, visual, and audio communications are used to furnish diagnostic and consultation pathways to reinforce clinicians at distant sites, assist in or directly deliver medical care to patients at distant sites, and enhance the skills and knowledge of distant medical care providers.”

There are many advantages of virtual health, for instance, the ability of both patient and health care provider to remain at distance, more convenience, and diminished cost. Recently, a successful adaptation of virtual adult and pediatric neurology outpatient care has been studied by various centers in the world during the pandemic. A high degree of contentment was observed among the health care providers, and a lower rate of face to face encounters while using the virtual clinic visit.

Keywords: COVID-19; Pandemic; Pediatric; Neurology; Clinic; Telemedicine clinic

INTRODUCTION

The ongoing COVID-19 challenge has upset the social, economic and health care system around the globe. Because of this pandemic, social distancing measures have been strictly implemented creating a profound stress on health care services. Telemedicine is an advancing and a timesaving means for emergency as well as non-urgent patient assessment. In this pandemic era, telemedicine has provided humanity with an alternative tool for provision of suitable clinical care within the short and safe therapeutic time window [1-3].

Telemedicine can be defined as “the implementation of telecommunication technologies to dispense medical information and services” and “the exercise by which electronic, visual, and audio communications are used to furnish diagnostic and consultation pathways to reinforce clinicians at distant sites, assist in or directly deliver medical care to patients at distant sites, and enhance the skills and knowledge of distant medical care providers” [4-6]. There are many advantages of virtual health, for instance, the ability of both patient and health care provider to remain at distance, more convenience, and diminished cost [7-9]. Recently, a successful adaptation of virtual adult and pediatric neurology outpatient care has been studied by various centers in the world during the pandemic. A high degree of contentment was observed among the health care providers, and a lower rate of face to face encounters while using the virtual clinic visit [6-10].

Telemedicine in pediatric neurology care has been reported less frequently as compared to adult stroke virtual clinics, specific disease populations such as epilepsy and headache. In this review, we analyzed the feasibility of implementation of telehealth medicine in pediatric neurology care. The potential of audio-video telemedicine encounters in pediatric neurology patient care and feasibility of incorporation of telehealth services into post-pandemic pediatric neurology clinic [7-11].

Reports of pediatric neurology telemedicine delivery have been limited to programs for underserved populations.

METHODS

We did search on PubMed, Medline database publications using: COVID-19, Pediatric clinic, telemedicine clinic, neurology. The publications included were special communications, reviews, conferences papers, books and research studies regarding the subject matter over last two years.

DISCUSSION

In the past 2 years, the COVID-19 pandemic has strained social, economic, and health care systems around the world. There had been an enormous effect on all specialty clinics, including neurology services due to the implementation of strict social distancing policies. Cancellations of the interventional procedures and the outdoor clinic visits were the results [7-10]. Owing to the safety concerns to health care workers and the patients alike, hospitals were in desperate search of new clinical pathways and technology gadgets during this crisis for maintaining the safety of the health care personnel and patients [9-10].

The Centers for Disease Control and Prevention has endorsed the concept of telemedicine in lieu of live clinic visits due to the anticipated uncertain duration of lock downs and social distancing [9-11]. In adult neurology clinic, Telemedicine has proved to have a precious role in emergency stroke consultation. Neurologists can swiftly evaluate and supervise the management of stroke patients by utilizing telemedicine and can help the remote physicians at the health units at distance. [9-12].

Rametta, et al. [13] shared their experiences regarding the utilization of telehealth services for outpatient child neurology care. They noticed, the satisfaction felt by the health care providers while using telemedicine for almost all virtual encounters with the children in need of neurology care. When asked further if they would choose to utilize telemedicine mode again? They opted for the ongoing use of telemedicine for the majority of the patients. Although the healthcare personnel reported few technical issues in about 33% of virtual visits, they still did not face much difficulty in providing services to the patients in need. Additionally, the majority of parents of the children also showed satisfaction regarding the telemedicine visits keeping in view the social distancing measures in the current pandemic.

Telemedicine for remote health care services include gadgets such as audio and video instruments [13,14]. This mode of health care diminishes the risk of pathogen exposure. Telemedicine, owing to accessibility, ease, maintaining high patient and family contentment: allows patient-centered care. One of the main advantages of telemedicine includes timely care by evading cancellations or delays in the provision of care during the current pandemic. Another positive aspect of telehealth services is averting the burden on health care providers or families of children in terms of travel and time requirements inherently linked with an in-person visit [13-15].



Danger of catching COVID infection is more in indoor activities. Contamination of surfaces was more frequent (in indoor datasets) compared to contamination of air samples; however, the average positivity rate was lower compared to that of air. Concentrations of SARS-CoV-2 RNA in air were highly variables and, on average, lower in outdoors compared to indoors. Among indoors, concentrations in community indoors appear to be lower than those in hospitals and healthcare settings [16].

In various studies, the observation of a high degree of contentment with the telemedicine process suggests that this model of health care provision is maintainable during and after the current pandemic. It is important to note that technical problems such as software updates and bandwidth expansion may arise. These are secondary to the enormity of data traffic across the hospital's networks. Despite these facts, many health care personnel have indicated that they would opt to continue telehealth even beyond the current pandemic if given the opportunity [12-15].

Findings in recent literature have shown that remote history taking and virtual examinations are efficacious for catering to pediatric neurology care. Other advantages of telehealth services in pediatric neurology were the removal of barriers to care linked with in-person encounters. The barriers observed in the case of underserved patients whose parents find it difficult to miss work or bear the extra costs of travel to the hospital in person, who live at quite a distance from health care facilities, or who have complex transportation needs. However, it is pertinent to note that there were some disparities in the provision of telehealth care to patients in racial and ethnic minority groups. They were the ones who were less likely to have access to the potentially more efficacious care that telemedicine encounters can provide compared to telephone encounters [14-16].

More research is needed regarding the implementation of telemedicine in pediatric neurology including the prospective studies to gauge patient-centered outcomes. Moreover, firm evaluation of the effects of distant monitoring technologies, including devices for detection of seizures, long-term remote EEG monitoring and introduction of electronic pillboxes, and actigraphy (a non-invasive technique used to assess cycles of activity and rest over several days to several weeks) might further strengthen the foundation for future use of telehealth services [17-20].

There are some challenges in certain neurological consultations that are less amenable to a virtual examination, such as concern for myelopathy or cauda equina syndrome in which formal strength, reflexes, appendicular and rectal tone, and saddle anesthesia are critical maneuvers that cannot be assessed by virtual interaction with patients. The quality of each patient-physician virtual interaction is unique. Moreover, it is affected by various factors such as type of neurological complaint, the efficiency of gadgets utilized, the patient's ability to handle the camera and compliance with instructions, and the involvement of a third party to help in the examination [19-23].

In recent literature, it was suggested that it is vital to promote the implementation of tele-neurology. There is a need to direct efforts towards enhancing the realization of its advantages and creating an atmosphere of organizational and infrastructural support. At last, qualitative research pertaining to individual experiences regarding the practice of tele neurology is also advocated [21-23].

CONCLUSION

In the light of challenges posed by the current pandemic,

implementation of telehealth visits in pediatric neurology (audio-video telemedicine encounters) have satisfactory outcomes. However, in a few patients, in-person follow-up is required. Further research is needed regarding the feasibility of implementing telehealth pediatric neurology clinics for a larger proportion of children across the globe to continue continued care even in the situation of pandemics.

REFERENCES

- Shoaib M, Noorani MM, Khaliq MF. Telemedicine: distance matters not now. *J Pak Med Assoc.* 2012 Nov;62(11):1268-9. PMID: 23866430.
- Kurji Z, Premani ZS, Mithani Y. Analysis Of The Health Care System Of Pakistan: Lessons Learnt And Way Forward. *J Ayub Med Coll Abbottabad.* 2016 Jul-Sep;28(3):601-604. PMID: 28712245.
- Iqbal N, Gulzar R, Riaz A, Iqbal A, Nadeem M, Yaseen K, et al. Utility of Telemedicine in Pediatric Urology Clinic during Covid-19 Era-Mini Review. *EC Paediatrics.* 2021;10:57-61. doi: 10.31579/2692-9406/049
- Schwamm LH, Estrada J, Erskine A, Licurse A. Virtual care: new models of caring for our patients and workforce. *Lancet Digit Health.* 2020 Jun;2(6):e282-e285. doi: 10.1016/S2589-7500(20)30104-7. Epub 2020 May 6. Erratum in: *Lancet Digit Health.* 2020 Jun;2(6):e292. PMID: 32382724; PMCID: PMC7202848.
- Gonzales S, Mullen MT, Skolarus L, Thibault DP, Udoeyo U, Willis AW. Progressive rural-urban disparity in acute stroke care. *Neurology.* 2017 Jan 31;88(5):441-448. doi: 10.1212/WNL.0000000000003562. Epub 2017 Jan 4. PMID: 28053009; PMCID: PMC5278944.
- Fuentes B, Alonso de Leciñana M, Calleja-Castaño P, Carneado-Ruiz J, Egido-Herrero J, Gil-Núñez A, Masjuán-Vallejo J, Vivancos-Mora J, Rodríguez-Pardo J, Riera-López N, Ximénez-Carrillo Á, Cruz-Culebras A, Gómez-Escalonilla C, Díez-Tejedor E; en representación de los hospitales del Plan Ictus Madrid. Impact of the COVID-19 pandemic on the organisation of stroke care. *Madrid Stroke Care Plan. Neurologia (Engl Ed).* 2020 Jul-Aug;35(6):363-371. English, Spanish. doi: 10.1016/j.nrl.2020.05.007. Epub 2020 May 21. PMID: 32563566; PMCID: PMC7241395.
- Levine SR, Gorman M. "Telestroke" : the application of telemedicine for stroke. *Stroke.* 1999 Feb;30(2):464-9. doi: 10.1161/01.str.30.2.464. PMID: 9933289.
- Iqbal N, Ali M, Ali T, Iftikhar M J, Kala M S, Kumar S, et al. Telemedicine in Urology Clinic in COVID Era and the Inherent Challenges in Developing Countries: Review Article. *J Biol Today's World.* 2020;9:001-003. <https://tinyurl.com/lykuf2y9>
- Rudilosso S, Laredo C, Vera V, Vargas M, Renú A, Llull L, Obach V, Amaro S, Urra X, Torres F, Jiménez-Fàbrega FX, Chamorro Á. Acute Stroke Care Is at Risk in the Era of COVID-19: Experience at a Comprehensive Stroke Center in Barcelona. *Stroke.* 2020 Jul;51(7):1991-1995. doi: 10.1161/STROKEAHA.120.030329. Epub 2020 May 22. PMID: 32438895; PMCID: PMC7258755.
- Patel UK, Malik P, DeMasi M, Lunagariya A, Jani VB. Multidisciplinary Approach and Outcomes of Tele-neurology: A Review. *Cureus.* 2019 Apr 8;11(4):e4410. doi: 10.7759/cureus.4410. PMID: 31205830; PMCID: PMC6561521.
- Dorsey ER, Glidden AM, Holloway MR, Birbeck GL, Schwamm LH. Teleneurology and mobile technologies: the future of neurological care. *Nat Rev Neurol.* 2018 May;14(5):285-297. doi: 10.1038/nrneurol.2018.31. Epub 2018 Apr 6. PMID: 29623949.
- Grossman SN, Han SC, Balcer LJ, et al. Rapid implementation of virtual neurology in response to the COVID-19 pandemic. *Neurology.* 2020;94(24):1077-1087. doi: 10.1212/WNL.0000000000009677
- Rametta SC, Fridinger SE, Gonzalez AK, Xian J, Galer PD, Kaufman M, Prelack MS, Sharif U, Fitzgerald MP, Melamed SE, Malcolm MP, Kessler SK, Stephenson DJ, Banwell BL, Abend NS, Helbig I. Analyzing 2,589 child neurology telehealth encounters necessitated by the COVID-19



- pandemic. *Neurology*. 2020 Sep 1;95(9):e1257-e1266. doi: 10.1212/WNL.00000000000010010. Epub 2020 Jun 9. PMID: 32518152; PMCID: PMC7538222.
14. Lo MD, Gospe SM Jr. Telemedicine and Child Neurology. *J Child Neurol*. 2019 Jan;34(1):22-26. doi: 10.1177/0883073818807516. Epub 2018 Nov 5. PMID: 30394826.
15. Sarwar MZ, Shoewu O, Ravich V, et al. Challenges faced in pediatric cardiology during COVID Pandemic: A Review. *Journal of Biology and Today's World*. 2021;24;10(6):1-2. <https://tinyurl.com/ykmtu4wf>
16. Dinoi A, Feltracco M, Chirizzi D, Trabucco S, Conte M, Gregoris E, Barbaro E, La Bella G, Ciccarese G, Belosi F, La Salandra G, Gambaro A, Contini D. A review on measurements of SARS-CoV-2 genetic material in air in outdoor and indoor environments: Implication for airborne transmission. *Sci Total Environ*. 2022 Feb 25;809:151137. doi: 10.1016/j.scitotenv.2021.151137. Epub 2021 Oct 23. PMID: 34699823; PMCID: PMC8539199.
17. Hollander JE, Carr BG. Virtually Perfect? Telemedicine for Covid-19. *N Engl J Med*. 2020 Apr 30;382(18):1679-1681. doi: 10.1056/NEJMp2003539. Epub 2020 Mar 11. PMID: 32160451.
18. Dayal P, Chang CH, Benko WS, Ulmer AM, Crossen SS, Pollock BH, Hoch JS, Kissee JL, Warner L, Marcin JP. Appointment completion in pediatric neurology telemedicine clinics serving underserved patients. *Neurol Clin Pract*. 2019 Aug;9(4):314-321. doi: 10.1212/CPJ.0000000000000649. PMID: 31583186; PMCID: PMC6745750.
19. Ashfaq A, Memon SF, Zehra A, Barry S, Jawed H, Akhtar M, Kirmani W, Malik F, Khawaja AW, Barry H, Saiyid H, Farooqui N, Khalid S, Abbasi K, Siddiqi R. Knowledge and Attitude Regarding Telemedicine Among Doctors in Karachi. *Cureus*. 2020 Feb 9;12(2):e6927. doi: 10.7759/cureus.6927. PMID: 32190480; PMCID: PMC7065727.
20. Bombaci A, Abbadessa G, Trojsi F, et al ; Digital Technologies, Web and Social Media Study Group of the Italian Society of Neurology. Telemedicine for management of patients with amyotrophic lateral sclerosis through COVID-19 tail. *Neurol Sci*. 2021;42(1):9-13. doi: 10.1007/s10072-020-04783-x
21. Al Hussona M, Maher M, Chan D, Micieli JA, Jain JD, Khosravani H, Izenberg A, Kassardjian CD, Mitchell SB. The Virtual Neurologic Exam: Instructional Videos and Guidance for the COVID-19 Era. *Can J Neurol Sci*. 2020 Sep;47(5):598-603. doi: 10.1017/cjn.2020.96. Epub 2020 May 21. PMID: 32434626; PMCID: PMC7347716.
22. Demaerschalk BM, Vegunta S, Vargas BB, Wu Q, Channer DD, Hentz JG. Reliability of real-time video smartphone for assessing National Institutes of Health Stroke Scale scores in acute stroke patients. *Stroke*. 2012 Dec;43(12):3271-7. doi: 10.1161/STROKEAHA.112.669150. Epub 2012 Nov 15. PMID: 23160878.
23. Yeung WK, Dawes P, Pye A, Neil M, Aslam T, Dickinson C, Leroi I. eHealth tools for the self-testing of visual acuity: a scoping review. *NPJ Digit Med*. 2019 Aug 22;2:82. doi: 10.1038/s41746-019-0154-5. Erratum in: *NPJ Digit Med*. 2019 Nov 26;2:117. PMID: 31453377; PMCID: PMC6706420.