

## Utilization of Telestroke during Pandemic COVID-19: A Scoping Review

Nandang DD Khairari

Nursing Department, Hamzar Intitute of Health Science, Indonesia

### ABSTRACT

**Background:** Telehealth in the setting of patient with stroke or widely known as a telestroke has been researched and practiced in various ways in past decades, but recently with the appearance of pandemic Covid-19 the utilization of telestroke needs to synthesis of the existing literature. This has been reported that there are changes in the utilization of of technology-based health services, includes in the use of telestroke. This study aims to review the utilization of telestroke during this recent pandemic Covid-19.

**Subjects and Method:** This study used scoping review as a method to answer the research question. The study was permormed by searching PubMed, Science Direct, BMJ, and Wiley Online Library databases from 2020 to June 2022. The studies that investigating the uses of telestroke during the period of pandemic Covid-19 were included to this scoping review. The PEOS framework and PRISMA flowchart has been utilized as a method to identifying and selecting the studies, as well as inclusion and exclusion criteria.

**Results:** There were 8 studies that relevant to inclusion criteria and reviewed in this study. The majority of telestroke studies were observational study using retrospective method. Five studies stated that the decreased number of utilization of telestroke during pandemic. Demographic characteristics of the study shown the mean age were >60 years old (87.5%), female patients were more than male (62.5%), primary diagnosed with ischemic stroke (87.5%), severity from mild to severe (62.5%), stroke patients were received thrombolysis (75%), and two studies stated shorter duration for patient to receive treatment.

**Conclusion:** Telestroke has been proven as an effective way in caring patient with stroke. Significant decreased number of telestroke admission was shown from most of the studies due to the Covid-19 while the explanation for this phenomena is still unclear.

**Keywords:** Telestroke, Covid-19, Scoping Review.

### Correspondence:

Nandang DD Khairari. Bachelor in Nursing Program of Hamzar Institute of Health Science. Jalan TGH. Zainuddin Arsyad, No : 100, Wanasaba District, East Lombok Region, West Nusa Tenggara. Dhe2304@gmail.com. Mobile. 0877-6505-6560.

### Cite this as:

Khairari NDD (2022). Utilization of Telestroke During Pandemic Covid-19: A Scoping Review. J Health Policy Manage. 07(03): 235-242. <https://doi.org/10.26911/thejhpm.2022.07.03.08>.



Journal of Health Policy and Management is licensed under a Creative Commons Attribution-Non Commercial-Share Alike 4.0 International License.

### BACKGROUND

The application of technology based to healthcare services has been improves since the last view decades. Telehealth services for stroke patient, namely called as Telestroke system, has been widely use around the world and has been proven effective in helping

patient as well as healthcare professional to manage stroke conditions. In stroke telemedicine or telestroke, doctors who have advanced training in treating stroke patients use technology to treat stroke patient in another location by working together with

local emergency doctors to recommend diagnosis and treatment to the patients. Through this systems, doctors and patient use digital video camera, internet telecommunications, robotic telepresence, smartphones, tablets and other technology (Mayoclinic, 2020).

Since it first appearance in Wuhan in 2019, Covid-19 has infected more that 545 million people and more than 6 million people confirmed death from this disease around the world (WHO, 2022). This Covid-19 caused by Severed acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Vergas et al., 2022). On March 11, 2020, the World Health Organization declared Covid-19 as a Pandemic and has been reported give impact to many sectors in healthcare services such caring for strokes. The studies conducted to seek the utilization of telestroke during pandemic Covid-19 and its has been reported that the stroke services during this crisis significantly decreased.

Hypothetically, the use of technology-base healthcare services, such as telehealth, would likely elevate during the pandemic period due to the social distancing and stay at home regulation that promote to reduce the spread of the virus. The application of telestroke have been proven to be effective to care stroke patient as well as to promote, evaluate and manage the disease, and rehabilitate related to stroke (Chen, 2022). In the contrary, this has been reported that the request for telestroke admission is decreased significantly after WHO declared this pandemic situation. While the cause of this phenomena is still unclear, the brief explanation of the situation is related to the nature of the disease and the policy related to infection control for the Covid-19. The aims of this study is to scope the existing literature on the utilization of telestroke during pandemic Covid-19.

## SUBJECTS AND METHOD

### 1. Study Design

This study used a systematic review and meta-analysis metod to review and analyse articles that came from various resources. Four main journal database were used in this study, that includes Pubmed, Science Direct, BMJ, and Wiley Online Library.

### 2. Inclusion Criteria

The inclusion criteria that were used in this study includes study that have been published between 2020-2022, open access, and full-text. Table 1 summarize the inclusion and exclusion criteria for this scoping review.

### 3. Exclusion Criteria

In this scoping review, the meta-analysis study like literature review and scoping review were excluded. In additional, the literature that founded in form of electronic book also excluded from being reviewed in this study.

### 4. Operational Definition of Variables

**Telestroke** in this study was defined as e-health based healthcare services used by doctors who have advanced training in treating stroke patients. This telestroke approach also called with stroke telemedicine which meant to help patients with stroke before admitted to hospital (pre-hospital), during, and post-hospitalization.

**Pandemic Covid-19** was defined as a crisis situation on world-wide that caused by Covid-19 break-out that have been announced by World Health Organization (WHO) as a global pandemic since March 11, 2020.

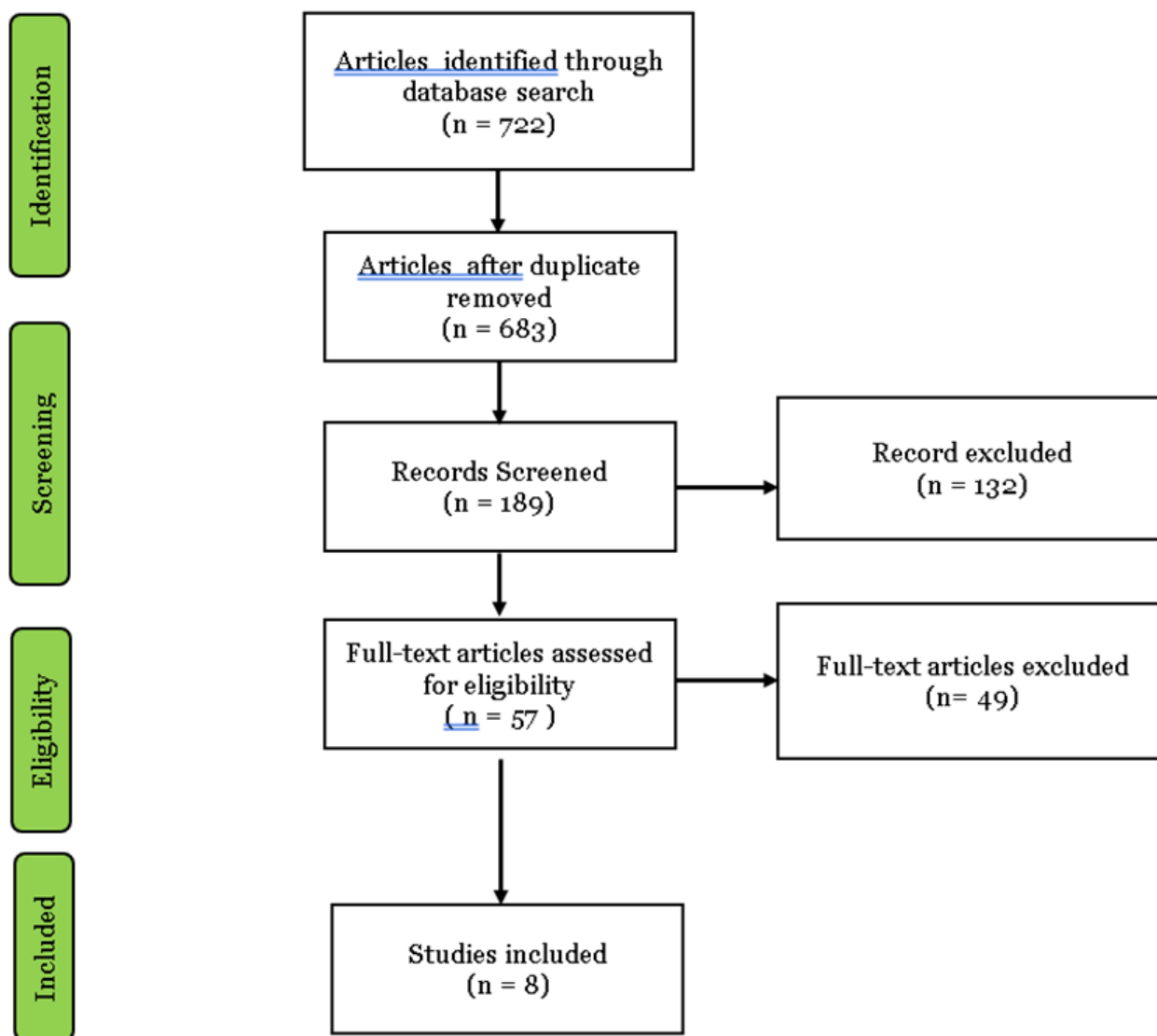
### 5. Instrument

The PEOS framework was used in this scoping review to help identify the articles includes to this study. The study also utilized the PRISMA flowchart as a method to selecting the articles to review that met inclusion criteria for the study.

**RESULTS**

This study identified 722 articles from 4 data-based and after removal of duplicates, there were 683 articles were included. Based on the eligible criteria for this scoping review, the 626 study articles were excluded using the title and abstract screening. Next, at the full

text screening, there were 49 studies were excluded. Finally, a total of 8 articles were relevant to inclusion criteria and were included in the study. Figure 1 bellow describe the PRISMA flowchart used to help reporting this study.



**Figure 1. PRISMA Flowchart**

Based on the study finding, there were 5 studies stated that during Pandemic Covid-19 there were significantly decreased of telestroke activations. One of the study stated that the number of telehealth in stroke

patients were reduce arround 50,8% if compared to before the pandemic. The average number of telestroke activation per day reduced from 4.7 to 2.4. The similar result also shown in the other study conducted by Vergas, et al (2021), they found that after the

declaration of pandemic on March 11, 2020 by the World Health Organization, there were 53% decrease in telestroke evaluation requests. An average of 7.9 telestroke requests per site during the period in 2020 were made, compare to average of 16.6 requests per site during the period in 2019. One out of eight studies stated that there were no significant different between pre and after

pandemic breakout. The study conducted by Chen, et al (2021), stated that the operation of the telestroke during 1 year after pandemic was hardly affected. The other 3 of the studies were not specifically stated the difference between pre and during the Covid-19 period in utilizing this telemedicine method. This data is summarized in table 1.

**Table 1. Telestroke utilization during Pandemic Covid-19**

Variable	n	%
Increase number of telestroke admission during covid-19	-	-
Decrease number of telestroke admission during covid-19	5	62.5%
No significant change	1	12.5%
Not stated	2	25%

Table 2 describes the type of study that utilized to investigating implementation of telestroke during Covid-19. Total of 7 studies (87.5%) were used retrospective observational study and 1 study (11%) used survey analysis. Retrospective study was conducted to observed the request for telestroke after the declaration of Covid-19 as a pandemic by WHO in March 11, 2020, and compared to prior to pandemic crisis. The time period that were used in each studies vary, start

from 30 days to one years (2021) after pandemic Covid-19 declaration. As stated in EBMT site, a retrospective design is performed a posteriori and using information on events in the past. The same discussion from nedarc site stated that a retrospective study utilizes administrative database, medical records, or interview with the patients who are already known to have a disease or condition that related to the topic of the study.

**Table 2. Type of the studies**

Type of study	volume	Percentages
Retrospective Observational	7 articles	87.5%
Survey analysis	1 article	12.5%

Based on the findings of each studies, 87.5% of studies stated that the mean age of stroke patients were more than 60 years old and 62.5% studies stated that the occurrence of stroke were likely more often in female than male. A primary diagnosis of ischemic stroke was documented in most of the articles finding (87.5%). Further results from the studies, there were 62.5% of studies claimed that their respondent level of severity

were shown from moderate to severe symptoms. Finally, the number of studies that shown the used of treatment, thrombolysis treatment, for stroke patients were 6 articles (75%) and two studies reported shorter time for patient received treatments. Table 3 summarize the result finding in this scoping review based on the demographic characteristics of reviewed articles.

**Table 3. Demographic Characteristics Shown by Studies**

Variable	Volume	Percentages
Mean age ≥ 60 year	7 articles	87.5%
Female > Male	5 articles	62.5%
Primary diagnose : ischemic stroke	7 articles	87.5%
Severity moderate to severe	5 articles	62.5%
Thrombolysis	6 articles	75%
Shorter DNT/improve treatment	2 articles	25%

Table 2 describes the type of study that utilized to investigating implementation of telestroke during Covid-19. Total of 7 studies (87.5%) were used retrospective observational study and 1 study (11%) used survey analysis. Retrospective study was conducted to observed the request for telestroke after the declaration of Covid-19 as a pandemic by WHO in March 11, 2020, and compared to prior to pandemic crisis. The time period that were used in each studies vary, start from 30 days to one years (2021) after pandemic Covid-19 declaration. As stated in EBMT site, a retrospective design is performed a posteriori and using information on events in the past. The same discussion from nedarc site stated that a retrospective study utilizes administrative database, medical records, or interview with the patients who are already known to have a disease or condition that related to the topic of the study.

Based on the findings of each studies, 87.5% of studies stated that the mean age of stroke patients were more than 60 years old and 62.5% studies stated that the occurrence of stroke were likely more often in female than male. A primary diagnosis of ischemic stroke was documented in most of the articles finding (87.5%). Further results from the studies, there were 62.5% of studies claimed that their respondent level of severity were shown from moderate to severe symptoms. Finally, the number of studies that shown the used of treatment, thrombolysis treatment, for stroke patients were 6 articles (75%) and two studies reported

shorter time for patient received treatments. Table 3 summarize the result finding in this scoping review based on the demographic characteristics of reviewed articles.

**DISCUSSION**

This scoping review was aimed at assessing the literature that investigate the used of telestroke post-pandemic declaration by WHO that affected many sectors in health-care services. The used of telehealth during the crisis has been reported increased significantly as a tools to overcome the limitation in delivering healthcare during the Covid-19. According to the reported provided by U.S. healthcare organizations, the role telehealth that has been played in transforming health-care services includes 3 phases, those includes: (1) stay-at-home outpatient care, (2) initial Covid-19 hospital surge, and (3) post-pandemic recovery (Wosik, et al, 2022). In contrary, the utilization of telestroke during pandemic has been reported decreased compared to pre pandemic situation.

The use of telestroke in managing stroke patients has been spoken to be effective in remote evaluation and rapid treatment for this disease. It provide reliable examination, increase recommendation of use thrombolysis treatmen, early screening for large vessel occlusion, and facilitate process of patient’s transferred to higher level of healthcare services. Within the studies reviewed in this scoping review, there was a notable reduction in the number of telestroke utilization. The influence factors for this phenomenon remains unclear, were

this due to a reduction incident of stroke during pandemic, patient-related factors, or reduction in utilization by emergency department physicians (Huang, et al, 2020).

Additional discussion delivered by study that have the same findings, the reason behind the changes may be possibly caused by saturation of medical services, a more strict adherence to guidelines in patient selection, the shelter in place policies adapted by local government, and delays in presentation to medical services for fear of contacting Covid-19. Stroke and stroke mimic symptoms may both influenced by Covid-19 neurological manifestation occurred. This may lead patients with milder stroke symptoms forego seeking medical attention because fear of contracting Covid-19 (Vergas, et al, 2021).

In contrary, one of the study found that there was no significant different in the number of telestroke utilization. The study explained that the reason for the difference was the longer time of study period and in the latter half a year after the outbreaks, the Covid-19 has been better controlled where the study was conducted.

Furthermore, there were six (75%) studies were mentioned about the patients received intravenous thrombolysis treatment. Two studies reported there were significant increase in percentage of inpatients stroke consults who received thrombolytics. The reason for this is still unknown and the direct relationship cannot be made (Sevilis, et al, 2022). In contrast, one of the study reported the decreased number of patients who received thrombolytics, while the rest have slightly decreased in number but statistically not significant. The decreased number that reported may lead by low NIHSS scores that suggesting mild stroke symptoms (Huang, et al, 2020).

Two studies reported that there were improvement in stroke care process. The

both study discussed about the decrease in DNT during the Covid-19 Period. The explanation for this was due to the fact that the patients who present to emergency room for stroke symptoms are those who are meet criteria for receiving treatment. The other explanation may includes the quick response to transport patients to the ward in pandemic situation with overcrowded emergency department, the protected stroke code, as well as a greater experience of local telestroke team (Sevilis, et al. 2022). The reason for this also added by Chen, et al (2022), by stated that it was due to lower total number of patients in most hospitals and smoother access to investigations and treatments.

This scoping review aimed to investigate the utilization of telestroke prior to post declaration of pandemic Covid-19 by WHO on March 11, 2020. There were 9 studies that were found discussed related to the topic from 4 databases used in this study and most of the study were used retrospective method. Most of mean age were more than 60 years old, and female sex are more likely have higher incident rate than male. Primary diagnosed were ischemic stroke that were retrieved from the studies findings, and more of the studies stated that the patient treated with thrombolysis. Even most of the studies claimed that the use of telestroke were effective in caring patient with stroke, a significant decreased of admission numbers to telestroke was shown from most of the studies due to the Covid-19 crisis while the explanation for this phenomena is still unclear. Finally for future study, it will be important to identify the factors influence the patient and healthcare provider in conducting telehealth or telemedicine for the patients prior to this very pandemic Covid-19.

### AUTHOR CONTRIBUTION

Nandang DD Khairari is the main researcher in for this scoping review study. In this study, the researcher contributed in all activities in the process of the study, those includes select the topic, identified and collect the data, as well as analysed, reviewed and reported the study.

### CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

### FUNDING AND SPONSORSHIP

The author did not receive any financial support and sponsorship.

### ACKNOWLEDGEMENT

I would like to thank Dr. Ronnell D. Dela Rosa, professor in this program, for his commitment to teaching us in research. Also I would like to thank everyone that involved to this study.

### REFERENCE

Chen N, Wu X, Zhou M, Yang R, Chen D, LiaoM, Deng Y, et al. (2022). Telestroke for the Treatment of Ischemic Stroke in Western China During the COVID-19 Pandemic: A Multicenter Observational Study. *Front. Neurol. FRONT NEUROL.* 1–7. doi: 10.3389/fneur.2021.822342.

Delfino C, Mazzon E, Cavada G, Muñoz, Venturelli P, Brunser AM, Díaz F, et al (2022). A Chilean Experience of Telestroke in a COVID-19 Pandemic Year. *Cerebrovascular Diseases.* doi: 10.1159/000523920.

Huang JF, Greenway MRF, Nasr DM, Chukwudelunzu FE, Demaerschalk BM, O'Carroll CB, Nord CA, et al (2020). Telestroke in the Time of

COVID-19: The Mayo Clinic Experience. *Mayo Clinic Proceedings*, 95(8): 1704–1708. doi: 10.1016/j.mayocp.2020.06.007.

Mayoclinic (2020). This Covid-19 caused by Severed acute respiratory syndrome coronavirus 2 (SARS-CoV-2). <https://www.mayoclinic.org/tests-procedures/stroke-and-telemedicine/about/pac-20395081>.

Nakornchai T, Conci E, Hensiek A, Brown J WL (2021). Clinician and patient experience of neurology telephone consultations during the COVID-19 pandemic. *Postgrad Med J.* doi: 10.1136/postgradmedj-2021-141234.

Nedarc site. (2019). Retrospective Study. <https://www.nedarc.org/statisticalhelp/projectdesign/retrospectivestudy.html>

Sevilis T, McDonald M, Avila A, Heath G, Gao L, O'Brien G, Zaman M et al (2022). Telestroke: Maintaining Quality Acute Stroke Care During the COVID-19 Pandemic. *Telemed e-health.* 28(4): 481–485. doi: 10.1089/tmj.2021.0149.

Stavrou M, Lioutas E, Lioutas J, Davenport RJ (2021). Experiences of remote consulting for patients and neurologists during the COVID-19 pandemic in Scotland. *BMJ neurol. Open.* 3(2): 1–9. doi: 10.1136/bmjno-2021-000173.

Steindal SA, Nes AAG, Godskesen TE, Dihle, A, Lind S, Winger A, Klarare A (2020). Patients' experiences of telehealth in palliative home care: Scoping review. *J. - Med. Internet Res.* 22(5): 1–11. doi: 10.2196/16218.

Vargas A, Osteraas ND, Dafer RM, Cherian LJ, Song SY, Connors JJ (2022). Acute telestroke evaluations during the COVID-19 pandemic. *Neurol. Sci.* 43(4): 2211–2215. doi: 10.1007/s10072-021-05826-7.

Wabila MM, Duncan C, Mackay G (2022). Evaluation of telemedicine for new out-patient neurological consultations. *BMJ neurol. Open.* 4(1). doi: 10.1136/bmjno-2021-000260.

World Health Organization. (2022). WHO Coronavirus (COVID-19) Dashboard. <https://covid19.who.int/>.

Wosik J, Fudim M, Cameron B, Gellad ZF, Cho A, Phinney D, Curtis S, et al (2020). Telehealth transformation: COVID-19 and the rise of virtual care. *J Am Med Inform Assoc.* 27(6): 957–962. doi: 10.1093/jamia/ocaa067.