SYSTEMATIC REVIEW

Role of virtual modality for stroke caregivers in facilitating stroke survivors and assessing their perceptions in the midst of COVID-19 pandemic [version 1; peer review: awaiting peer review]

Adeel Khoja¹,², Naureen Akber Ali¹, Noshaba Akber³, Jade Harrison⁴, Fizzah Kazim⁵

¹Aga Khan University Hospital, Karachi, 74800, Pakistan
²Medicine Department, Aga khan University, Karachi, 74800, Pakistan
³University of Karachi, Karachi, 75400, Pakistan
⁴Flinders University, Adelaide, South Australia, 5042, Australia
⁵Dow University of Health Sciences, Karachi, 74200, Pakistan

Abstract

Background:
Stroke survivors become either partially or completely dependent on their family members for assistance. Furthermore, the COVID-19 pandemic has created a new set of challenges for caregiving, due to government-imposed lockdowns. In the current crisis, the crucial role of virtual modality in stroke caregiving can no longer be ignored.
Therefore, this review aims to report the utilization of virtual modality to facilitate stroke caregivers in delivering care to stroke survivors in this pandemic. Moreover, it will also assess the perceptions of stroke caregivers in managing stroke survivors during pandemic.

Methods:
An electronic search was carried out between 1 December 2019 to 31 March 2022 to explore the role of virtual platforms to assess stroke caregivers’ perceptions and the use of a distant medium in managing stroke survivors’ care in the COVID-19 era by using four electronic data bases that includes PubMed, CINAHL Plus, Science Direct, and Cochrane.

Results
The COVID-19 pandemic has undoubtedly complicated the stroke caregiver’s life and their ability to deliver care. Therefore, utilizing virtual medium serves as a unique supplemental resource in warranting patient care continuity. The current review provides evidence for the integration of distant modality in facilitating stroke caregivers to manage stroke survivors and it also assesses their
perception during pandemic.

**Conclusion:**
The current review provides limited but encouraging data that promotes the efficacy of virtual models in healthcare. It was identified that distant healthcare services are suitable and accessible for the provision of care to the community of stroke caregivers during this pandemic.

**Keywords**
COVID-19, Stroke caregivers, virtual modality, COVID-19 pandemic, online modality
**Introduction**

Stroke remains one of the most common non-communicable diseases to cause disability worldwide\(^1\) with a staggering number of over 130 million disability-adjusted life years (DALYs).\(^2\) The global burden of disease (GBD) study has estimated about 80 million stroke survivors living worldwide\(^3\) and the number continues to increase.\(^1\) Stroke survivors become either partially or completely dependent on their family members for assistance in not only their medical care, but also all other activities of daily living such as eating, drinking, bathing or grooming.\(^7\) The financial, emotional and psychological burden on the caregivers of such patients is immense,\(^4\) since it significantly affects their overall quality of life; potentially leaving them distressed and unable to properly care for themselves or their unwell loved ones.\(^6\)

The current COVID-19 pandemic has infected over 166 million people worldwide as of May 24, 2021, with the greatest number of confirmed cases in the USA, followed closely by India and Brazil.\(^6\) Hospitals are experiencing massive inflow of COVID-19-positive patients leading to closure of elective surgeries, out-patient clinics and deferral of non-COVID-19 related conditions, rendering access to healthcare even more difficult. Furthermore, the pandemic has created a new set of challenges for caregiving, due to government-imposed lockdowns, curfews and strict policies of social distancing.\(^7,8\) About 79% of informal or family caregivers of stroke patients reported feeling more frustrated and 62% have not been sleeping well since the pandemic started.\(^9\) In the current crisis, the crucial role of virtual modality in stroke caregiving can no longer be ignored.\(^10,11\) This virtual platform allows continued delivery of medical health services and other interventions without person-to-person contact, maintaining social distancing as a prerequisite for the prevention of spreading the COVID-19 virus.\(^11\)

Virtual modalities offer diverse interventions that focus on a wide variety of issues such as mental health,\(^12\) caregiver burden,\(^13\) education\(^14\) and physical rehabilitation.\(^15\) Approximately 86% of stroke survivors and their caregivers have access to the internet\(^16\) and about 3 billion people own smartphones worldwide\(^17\) which further highlights the accessibility and feasibility of virtual interventions. Telemedicine video messages on stroke have also shown a reduction in post-stroke mortality by about 7%, highlighting the role of distant modality in educating patients and caregivers in a developing country.\(^18\) Educational videos have also helped improve motor rehabilitation in acute stroke patients.\(^15,19,20\) For example, a study conducted by Huang et al. showed 30% reduction in cases of subdeltoid bursitis in patients who watched 15-minute videos twice a day during their hospital stay.\(^20\)

There is a dire need to implement distant modality in the current unprecedented time that mainly aims at reducing the stroke caregiver burden. Therefore, the main aim of this review is to highlight the crucial role of virtual modality to facilitate stroke caregivers in delivering care to stroke survivors amidst the COVID-19 pandemic. In addition, this review will also shed light on the perceptions of stroke caregivers in managing stroke survivors in the midst of this pandemic.

**Objectives**

The objective of this review is twofold:

1. To report the utilization of virtual modality to facilitate stroke caregivers in delivering care to stroke survivors in this pandemic
2. To assess the perceptions of stroke caregivers in managing stroke survivors in the midst of this pandemic

**Methods**

The methodological framework outlined by Levac and his colleagues was used for this review which was centered on previous work done by Arksey and O’Malley.\(^21,22\) This guided systematic steps that included identifying appropriate studies according to the research objectives, selecting relevant studies, summarizing, and reporting the important findings. This search directed the role of distant modality in facilitating stroke caregivers to care for stroke patients in the COVID-19 pandemic and also explored care giver perception in this challenging time. This framework was used to categorize the range of interventions or modalities (virtual: online/video/teleconferences or telephone) which can be used to stimulate disease management and health promotion among stroke patients.

The paper has been designed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist.\(^23\) The review protocol has been registered in the International Prospective Register for Systematic Reviews (PROSPERO) CRD42018087585.
Eligibility criteria

Participants

Studies involving adult stroke caregivers and stroke patients (irrespective of sex) using virtual medium to facilitate care and assessing their perception in the current pandemic were included.

Settings

Studies from both high- and low-middle-income countries were included.

Intervention and outcomes

Studies were included that defined the use of virtual platforms involving stroke caregivers during the COVID-19 pandemic. The outcome of this study was to assess the perception of stroke caregivers and utilization of distant service to facilitate caregivers of stroke survivors to promote continuity of care, disease management and health promotion.

Type of studies

Randomized controlled trials (RCTs), non-randomized studies, pre- and post-test designs (quasi-experimental studies), non-experimental observational (cross-sectional, case-series, case studies), qualitative papers and mixed-method designs were included in this review. Commentaries, editorials, symposium proceedings, and systematic reviews were excluded in this review.

Time period

Studies published between December 2019 and March 2022 were included as the COVID-19 pandemic has emerged since then. English language articles were included only since the authors are proficient in this language. The inclusion and exclusion criterion are illustrated in Table 1.

Information sources and search strategy

An electronic systematic literature search was conducted to explore the role of virtual platforms to assess stroke caregivers’ perceptions and the use of a distant medium in managing stroke survivors’ care in the COVID-19 era. We searched four electronic databases including PubMed (RRID:SCR_004846), EBSCO CINAHL (RRID:SCR_022707),

Table 1. Eligibility criteria.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Studies involving stroke caregivers who are involved in virtual medium in the COVID-19 pandemic</td>
<td>Studies involving other caregivers who are involved in virtual medium not in pandemic era</td>
</tr>
<tr>
<td>Intervention</td>
<td>Studies that have integrated any virtual mean to interact with caregivers</td>
<td>Studies involving face to face interaction with caregivers</td>
</tr>
<tr>
<td>Comparison</td>
<td>The comparison is the usual standard of care, or in the case of a randomized control trial, the comparison is the control condition</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Outcome</td>
<td>Utilization of virtual modality to facilitate stroke caregivers to promote continuity of care, Health promotion and disease management of stroke patients, Perception of stroke caregivers</td>
<td>Studies with other outcomes (behavioral change and education awareness) on other chronic patients</td>
</tr>
<tr>
<td>Setting</td>
<td>Studies conducted in developed and developing countries</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Study Designs</td>
<td>Randomized and non-randomized controlled trials, pre- and post-test designs, non-experimental observational (cross-sectional, case-series, case studies) qualitative papers and mixed-method papers</td>
<td>Commentaries, editorials, symposium proceedings, systematic reviews</td>
</tr>
<tr>
<td>Language</td>
<td>Studies available in English language as authors are proficient in this language</td>
<td>Studies which were not available in English translation</td>
</tr>
<tr>
<td>Time period</td>
<td>Studies published between 1 December 2019 to 31 March 2022</td>
<td>Studies published before that period</td>
</tr>
</tbody>
</table>
Science Direct, and Cochrane Library (RRID:SCR_013000) as they are generally considered to be large databases for reviews. These databases were searched using a detailed search strategy. The reference list of all the included studies were also cross checked to identify any relevant articles. The databases were searched by two reviewers independently (NA and AK). The search terms were grouped under five major categories of interest: population (adult stroke caregivers, adult family caregivers), intervention (virtual: online/videos/teleconference or telephone), outcomes (perception of stroke caregivers and utilization of distant service to facilitate stroke caregivers to promote continuity of care, disease management and health promotion among stroke survivors in this current pandemic) and settings (studies from high and low middle-income countries) and time period (December 1, 2019 and March 31, 2022) were included. Additionally, indexed keywords in the Medical Subject Headings (MeSH) were used in order to ensure uniform search terms. The search strategy was piloted to ensure sufficient specificity and sensitivity. The preliminary search strategy is illustrated in Table 2.

Endnote citation management software (version 20.2.1.15749)(RRID:SCR_014001) was used to export the records from all the various electronic databases. To ensure the reliability of articles among the two reviewers, a screening form was designed to verify the relevance of the articles. Each reviewer provides strong justifications for excluding any study. Any discrepancy between two reviewers (NA and AK) was resolved by the help of a third reviewer in a consensus meeting. The third reviewer (JH) was referred to make the final decision about inclusion of study in accordance with the eligibility criteria. Firstly, all studies were screened by title, secondly by abstracts and lastly full text were reviewed to exclude studies that are not meeting the inclusion criteria.

Quality assessment of included studies
We utilized the mixed methods Appraisal Tool (MMAT) mentioned in Table 3, to assess the methodological quality of the included studies. The tool was suitable for this review as it is explicitly designed for quality appraisal in systematic reviews involving qualitative, quantitative and mixed method study designs. The checklist has four criteria each, and studies are scored by dividing the number of criteria met by four to arrive at a value ranging from 25% to 100%.

Table 2. Search strategy.

| Intervention       | ("virtual"[All Fields] OR "virtuals"[All Fields]) OR "online"[All Fields] OR ("telephone"[MeSH Terms] OR "telephone"[All Fields] OR telephones"[All Fields] OR "telephoned"[All Fields] OR "telephonically"[All Fields] OR "telephoning"[All Fields]) OR ("telehealth s"[All Fields] OR "telemedicine"[MeSH Terms] OR "telemedicine"[All Fields] OR "telehealth"[All Fields]) OR ("telemedicine"[MeSH Terms] OR "telemedicine"[All Fields] OR "telemedical s"[All Fields]) OR "telestroke"[All Fields] OR ("video s"[All Fields] OR "videoed"[All Fields] OR "videotape recording"[MeSH Terms] OR "videotape recording"[All Fields] OR "video"[All Fields] OR "videos"[All Fields]) AND ("visit"[All Fields] OR "visited"[All Fields] AND |
| Setting            | ("developing countries"[MeSH Terms] OR ("developing"[All Fields] AND "countries"[All Fields]) OR "developing countries"[All Fields] OR ("developing"[All Fields] AND "country"[All Fields]) OR ("developing country"[All Fields]) AND ("developed countries"[MeSH Terms] OR ("developed"[All Fields] AND "countries"[All Fields]) OR "developed countries"[All Fields] OR ("developed"[All Fields] AND "country"[All Fields]) OR ("developed country"[All Fields]) AND |
| Filters            | Publication date from December 1, 2019 to March 31, 2022; Humans; English |

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Qualitative Studies using MMAT</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are the qualitative data collection methods adequate to address the research question?</td>
<td>Is the findings adequately derived from the data?</td>
</tr>
<tr>
<td>Lee JJ et al., 2021</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sutter-Leve R et al., 2021</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total = 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Quantitative randomized controlled trials using MMAT</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braley M et al., 2021</td>
<td>Is randomization appropriately performed?</td>
<td>Are the groups comparable at baseline?</td>
</tr>
<tr>
<td>Total = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Quantitative non-randomized using MMAT</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wu YR et al., 2020</td>
<td>3.1. Are the participants representative of the target population?</td>
<td>3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?</td>
</tr>
<tr>
<td>Total = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Mixed methods studies using MMAT</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliba-Gustafsson EA et al., 2020</td>
<td>Are the different components of the study effectively integrated to answer the research question?</td>
<td>Are the outputs of the integration of qualitative and quantitative components adequately interpreted?</td>
</tr>
<tr>
<td>Total = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study citation</td>
<td>Country</td>
<td>Study design</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Saliba-Gustafsson et al., 2020</td>
<td>United States</td>
<td>Mixed methods</td>
</tr>
<tr>
<td>Wu YR et al., 2020</td>
<td>Taiwan</td>
<td>Implementation study</td>
</tr>
<tr>
<td>Table 4. Continued</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Study citation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Study design</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Study population</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Study objective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Important findings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mode of intervention/modality</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Braley M et al., 2021**
*United States and Canada*

**Experimental Study**

Thirty two participants completed the study.

**To assess the feasibility and clinical efficacy of a virtual speech, language, and cognitive digital therapeutic for individuals with post-stroke aphasia relative to standard of care.**

As the clinician was remote, a caregiver was present with the participant during the virtual assessment to facilitate the administration of the study interventions. At the start of the assessment, a brief training was provided to the participant and caregiver on the use of the virtual technology, which enabled the feasibility of a fully virtual trial for patients with post-stroke aphasia, especially given the ongoing COVID-19 pandemic, as well as a safe, feasible, and efficacious digital therapeutic for language/cognitive rehabilitation.

**Important findings**

Overall, this study demonstrates the feasibility of a fully virtual trial for patients with post-stroke aphasia, especially given the ongoing COVID-19 pandemic, as well as a safe, feasible, and efficacious digital therapeutic for language/cognitive rehabilitation.

**Lee JJ et al., 2021**
*China*

**Qualitative interview data**

25 Chinese adult primary stroke caregivers

**To explore the stroke caregiving experience and burden, relationship between caregiver and care recipient, and needs of stroke family caregivers during the COVID-19 pandemic.**

Five themes of the stroke caregiving experience during the COVID-19 pandemic emerged: care service adversities, additional caregiving workload and strain, threatened relationship between caregiver and stroke survivor, and caregiver's physical and psychological well-being.

**Important findings**

Findings suggested that caregivers were physically and emotionally affected because of increases in care burden with simultaneously reduced formal and informal support. The relationship between caregiver and stroke survivor was subsequently affected, placing some survivors at heightened risk of abuse.

**Sutter-Leve R et al., 2021**
*United States*

**Phenomenological study**

Eleven informal caregivers of persons with newly acquired stroke

**To explore the experiences of caregivers of persons with newly acquired stroke during COVID-19 pandemic.**

Eleven informal caregivers' perspectives generated 13 subthemes across 4 primary thematic categories: caregiver, coping strategies, and importance of care. COVID-19 social distancing necessitated new visitor policies, which presented additional challenges for caregivers.
We adapted MMAT by assessing each segment separately and then selecting the lowest quality rating for all studies. Articles were not excluded based on MMAT score; the aim was to assess and gain insight into the rigor of current studies in this field. Two reviewers (NA and AK) independently examined the quality of the eligible studies. Any disagreements between reviewers were resolved by mutual agreement or by the decision of a third independent reviewer (JH). Data on quality appraisal is provided in Table 3 for all the included studies.

Data collection process
Two independent reviewers (NA and AK) extracted the data on the customized data extraction sheet for all the included studies. Data extraction tables of two reviewers were matched to make sure that all important findings are added. A third evaluator (JH) was involved, if any discordant information was observed during the data extraction process. The preliminary data extraction table is shown in Table 4. Alongside, to determine items for the data extraction form, all the existing studies in this research area/topic were reviewed. The items included in the preliminary data extraction form; study citation (title of the article, author, publication date), country of study, study design, study population, purpose/aim of the study, type of modality/intervention used, and study finding.

Results
Using the above-mentioned methods, a total of 654 citations were retrieved, which, when reviewed, yielded 156 articles selected on title basis. From these, 70 articles were selected based on the abstracts. Next, the full texts of 21 articles were reviewed to verify if they meet the inclusion criteria and finally, five studies were selected and used for the purpose of this review. The Preferred Reporting Items for Systematic Reviews and Meta analyses (PRISMA) flow diagram was used to report the study selection process (Figure 1). Since, given the nature of the selected studies, a formal systematic review or meta-analysis was not possible, a narrative review was composed by grouping the studies under the domain of telehealth applications using the methodological framework set out by Levac et al. (2010) based on the previous work of
Arksey and O’Malley (2005). This approach gave our review the directive for identifying the relevant studies according to the research aim, selecting appropriate studies and then summarizing and reporting the main findings. The review included the data of five selected studies that used a virtual medium for stroke caregivers during the COVID-19 pandemic. Majority of the studies were conducted in the USA and other enrolled participants from Canada, China and Taiwan. The results are summarized in Table 4.

**Utilization and acceptance of remote health services**

Clinical staff converted more than 90% of scheduled face-to-face visits to video visits and 98% of all clinicians utilized telehealth services in their care within the six weeks of implementation. Video visits were reported to be acceptable by clinicians as well as being considered to be suitable and feasible for patients, families, and caregivers as compared to in-person visits. Moreover, patients and families/caregivers highlighted that video visits aid in reducing travel time, cost, and time commitment as there is no need to travel long distances for appointments. Clinicians also mentioned that telehealth visits alleviate the burden on family/caregivers. This was particularly the case for patients who required assistance to reach clinics. They also added that online services help them to observe patient’s homes and meet caregivers and family members. The observation of patients at home is a reported advantage of video visits; it can lessen patient and caregivers stress, and permit evaluation of fall risks and ongoing practices that are not possible to catch during an in-person visit. Therefore, many clinicians expressed positive views regarding the use of neurology telehealth services in the future. This paper highlights that considering the COVID-19 pandemic condition it is essential to leverage the existing healthcare system with virtual visits as it promotes continuity of care by preventing the transmission of infection among health workers, patients, and their caregivers. Thus, health care systems should integrate this innovative modality into long-term care plans in order to provide an opportunity to assess this medium for the care of patients with chronic illnesses and conditions.27

The National Taiwan University Hospital has offered telehealth family conferences for different chronically ill patients including stroke patients during the COVID-19 pandemic. However, due to restrictions on family visits, only one caregiver per patient is permitted in hospital. In these circumstances, telehealth-based family conferences have given an opportunity to involve additional family members/caregivers to be involved in critical care decisions. Out of 14 families, five families (36%) rated telehealth family conferences either good or very good whereas nine families ranked it as neutral, and negative feedback is absent. It was identified that 12 families (90%) were using teleconferences for the first time and 10 families (71%) have shown their willingness to use this modality again for family meetings. In the midst of this pandemic, telehealth family conferences improved conditions by virtually connecting family caregivers with clinicians which facilitated effective communication.28

**Disease management and health promotion**

An experimental study was conducted on thirty-two post-stroke aphasia patients recruited from the USA and Canada. The experimental group received an online treatment for speech, language and cognitive therapy while patients in the control arm obtained standard care i.e. speech-language pathology workbook pages. Care-giver presence was essential for the recruitment and assessment of the study participants (stroke patients). Research staff set up a telephonic phone call with participants and caregivers to explain the purpose of study. As the physician was remote, a caregiver was involved with the study participants at the time of virtual assessment for the smooth facilitation of teleconferencing. Before the initiation of assessment, a short training was given to the participants and their caregiver regarding the video-conferencing tool. The experimental study highlights the need of involving caregivers to virtually assess and intervene post stroke patients which is found to be an efficient way to promote quality care in stroke patients. This study showed the feasibility of online trials for language and cognitive rehabilitation in post stroke patients. This is of particular importance in the pandemic setting as it is a safer and efficacious medium in the current crisis.25

**Need of virtual care for stroke caregivers and survivors during pandemic**

A study conducted by Lee et al. explored the effect of COVID-19 pandemic on stroke caregivers during the closure of day care centers and rehabilitation services. In-depth semi structured interviews were carried out with 25 stroke caregivers in Hong Kong from May 2020 to June 2020. Interview findings revealed that some caregivers were overburdened with workload via being required to provide 24-hour care and taking up the therapist role. Furthermore, they faced issues due to healthcare service adversities (closure of stroke center and rehabilitation services) related with the COVID-19 pandemic and reported a decline in stroke-survivor mobility and an increase in stroke survivors’ dependency. Caregivers were also anxious about exposing stroke survivors and being exposed themselves to COVID-19 infection. Furthermore, it was identified that the relationship between caregivers and survivors became impaired, escalating the risk for abuse leading to physical and psychological distress within caregivers. The study findings suggested that the disruption in the healthcare sector has certainly increased caregivers’ workload which impacted stroke survivors that are in need of ongoing rehabilitation and disease management care. Therefore, caregivers insisted the need of implementing a virtual
medium to increase access to healthcare along with trainings and education on stroke care skills and rehabilitation exercises which will reduce their burden.26

Another study conducted between February 2020 and April 2020 reported the effect of COVID-19 on family caregivers of newly acquired stroke survivors admitted to an inpatient rehabilitation department in the Mayo Clinic, USA. In an attempt to lessen the transmission of infection, a no visitor policy was in place within the institution. This excluded family training on the day of discharge. In consequence, caregivers raised their concerns about rehabilitation care provided to their loved ones in their absence. Caregivers highlighted they were uncertain about patient’s progress and missed opportunities to witness rehabilitation therapy sessions and care required, which would have guided them to continue caring for stroke patients after discharge. They also verbalized contacting healthcare providers was quite hectic, mostly needing many phone calls and oftentimes, they had to wait the entire day to receive a return call. Additionally, connecting with stroke survivors was also tough, particularly regarding patients with impaired speech or cognitive issues that elevated caregivers’ mental distress. However, with the emergence of the COVID-19 pandemic, caregivers highlighted the importance of integrating virtual medium (schedule phone calls or video conference calls) in the current health pathway to receive updates from all healthcare teams. Thus, telehealth conferences or sessions would also enable them to learn skills and observe functional improvement of their family members.7

Discussion
The coronavirus disease 2019 (COVID-19) pandemic has undoubtedly complicated the stroke caregiver’s life and their ability to deliver care. Therefore, utilizing virtual medium serves as a unique supplemental resource in warranting patient care continuity. The current review provides evidence for the integration of distant modality in facilitating stroke caregivers to manage stroke survivors and it also assesses their perception in the midst of the pandemic.7,25–28 Although there is a huge burden in terms of stroke caregiver’s cost and time to society, we identified only five studies that fall under the eligibility criteria for this review as there is growing evidence in this domain with respect to the pandemic. Therefore, the number of studies gathered from this review is comparatively low and are mainly from the developed world, significant data is still needed with directives for all experts to employ virtual health care services for the developing countries during the current unprecedented time. Due to lack of evidence and the heterogeneity of the distant approaches and outcomes measures, interpretation through meta-analyses is restricted. Overall, all studies included in this review scored 3 and above (on a scale of 4) on assessing quality based on the MMAT tool indicating the importance of the methodological rigor of research.

Given that to the authors knowledge, this is the first review that captures stroke caregivers’ perception and caters the role of distant modality in facilitating stroke caregivers to manage stroke survivors during the COVID-19 pandemic. The review reports evidence of launching distant modality at different levels of the healthcare system, including: ambulatory neurology clinics, family conferences, virtual speech, language and cognitive rehabilitation care (assessment and therapy).25,27,28 Studies in this review highlight that virtual health solutions during the pandemic are preferred by the clinicians, patients, and their caregivers as it promotes patients’ wellbeing, lessens caregiver burden and prevents transmission of the virus.25,27,28 Literature also reported that the prime benefit of escalating virtual health services irrespective of any restrictions would definitely reduce in-person contact that would minimize the exposure risk of non-infected but susceptible individuals in the waiting area of clinics.29 Moreover, this modality provides healthcare teams an opportunity to observe stroke patients in their own homes which allows for the assessment of fall risk and habitual behaviors which are not always evident during face–face visits.7 Likewise, patients and caregivers were also positive towards this dynamic modality as it was found to be convenient, cost-effective and time saving. This was predominantly the case for older adults and those who cover long distances for appointments, thus decreasing caregiver and patient’s distress.27,28 The findings are consistent with previous review, proposing virtual methodology serves as an accessible and potentially effective medium for managing chronic patients and assisting their caregivers.13,14,30

Also, it was witnessed that caregivers preferred remote consultation and were highly satisfied with it as it was very helpful in achieving care goals for stroke survivors.27,28 Additionally, the present review also captured the physical and psychological distress experienced by the caregivers due to imposition of pandemic measures, resulting in healthcare adversities, i.e., restriction on caregiver’s visits, closure of clinics and rehabilitation services.7,26 Therefore, caregivers raised their concern of introducing remote services to involve themselves in a plan of care to gain knowledge about disease management, learn rehabilitation therapy skills, communicate with healthcare teams and witness their patient improvement. This aid in mitigating their burden and facilitate smooth patient care.7,26 Simultaneously, the current review has also pointed out the practical constraints and barriers to uptake virtual health solutions for stroke care including access to technology, network connection, technology literacy and language difficulties.25,27

The virtual approach has opened a door of opportunity for stroke patients and their caregivers. However various innovative dimensions must be set up in different remote regions for vulnerable populations to address obstacles in
optimizing provision of care as well as explore challenges they face in the current unprecedented time. Furthermore, it is reflected that perceived sustainability of remote consultation is in growing demand and could be integrated into practice for long term implication following the COVID-19 pandemic. In that regard, a greater number of studies are required to refine the existing work with evidence-based knowledge and to incorporate it within the existing published framework. Therefore, proper steps are needed to embed this innovative mode into the health care services that can probably cover the barrier of proximity and offer suitable treatment to stroke patients that are in urgent need which ultimately reduce the caregivers’ workload and prevent chain of transmission.

Conclusion
The current review provides limited but encouraging data that promotes the efficacy of virtual models in healthcare. It was identified that distant healthcare services are suitable and accessible for the provision of care to the community of stroke caregivers during this pandemic. Moreover, in the present condition of the swiftly changing COVID-19 environment, the healthcare system should consider maintaining a positive caregiver experience as it could affect their patient’s health outcomes. Also, the need for distant stroke care services will surely rise due to restrictions surrounding the COVID-19 pandemic.

The long-lasting effect of the pandemic on stroke survivors and their caregivers calls for severe efforts on behalf of healthcare organizations to look at the matter in broader lens and to instill novel means of care for the welfare of the stroke patients and their caregivers. Thus, there is dire need for integrating this medium in several regions, mainly in the low- and middle-income countries where healthcare infrastructure is often under-developed, and the COVID-19 impact is likely to be exacerbated. This will strengthen the practice and assist in the development of policy during and after COVID-19 outbreak.

Data availability
Underlying data
All data underlying the results are available as part of the article and no additional source data are required.

Reporting guidelines

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

References


The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com