European Journal of Environment and Public Health
2023, 7(4), em0146
e-ISSN: 2542-4904
https://www.ejeph.com

MODESTUM

Research Article

OPEN ACCESS

A closer look at dementia patients' barriers to telemedicine utilization during the COVID-19 pandemic

Siddig Fageir [1]*, Omer Osman [2], Clifton Addison [3]

[1] Department of Social Sciences, Alcorn State University, Lorman, MS, USA
[2] Department of Natural Sciences and Environmental Health, Mississippi Valley State University, Itta Bena, MS, USA
[3] Department of Epidemiology and Biostatistics, Jackson State University, Jackson, MS, USA
***Corresponding Author:** sfageir@alcorn.edu

Citation: Fageir F, Osman O, Addison C. A closer look at dementia patients' barriers to telemedicine utilization during the COVID-19 pandemic. EUR J ENV PUBLIC HLT. 2023;7(4):em0146. https://doi.org/10.29333/ejeph/13408

ARTICLE INFO

Received: 25 May 2023

Accepted: 10 Jun 2023

ABSTRACT

During the COVID-19 pandemic, dementia patients faced reduced mental health support, more social isolation, and higher rates of depression. To assist, telemedicine emerged as a suitable alternative to physical physician consultations. However, the use of telemedicine for dementia care was impacted by numerous factors, including high costs, lack of suitable hardware, poor internet connectivity, and sensory impairment of the patient. This article is an attempt to analyze the use of telemedicine for dementia care during the COVID-19 pandemic and identify barriers to its usage from caregivers' perspectives. The analysis focused on four identified categories of barriers related to technology, participant abilities, participant attitudes, and costs. The findings demonstrated that lack of suitable technology and digital literacy were major barriers to the adoption of telemedicine in dementia care.

Keywords: telemedicine, dementia, COVID-19

INTRODUCTION

The physician-patient relationship is the backbone of healthcare. This relationship is built through ease of access, consultations, continuity of care, and support during emergencies, all provided by the physician. Worldwide, the parameters that define the quality of healthcare include accessibility, affordability, coordination of care, continuity of care, and good care outcomes.

The use of technology in healthcare has become an integral component of the modern healthcare system. Digital applications in healthcare, such as hospital lab and radiology information systems, electronic and personal health records, telemedicine, and remote monitoring systems, have proven to be essential to today's healthcare system.

Specifically, telemedicine has become an important digital health service. It facilitates the provision of real-time healthcare to patients who are remotely located or unable to travel to a physical location for their healthcare needs. It has expanded in context from being a mere video consultation with the physician to include ancillary services, mental and physical health support, interactive forums, classrooms, and even non-real-time content, delivered to the patient at their home. Today, not only is a physician able to conduct a follow-up consultation for their patient through telemedicine but there are many aggregators who allow patients to discover the physicians of their choice and have online consultations.

Factors That Drive Use of Telemedicine

In addition to the parameters for healthcare quality, certain additional aspects come into play when a patient decides to try telemedicine:

1. Veracity of the healthcare provider and facility–For a first-time patient, it is important for them to know that the healthcare provider and the healthcare facility on the other side of the screen are indeed genuine.
2. Transparency of pricing–Apart from the physician charges, all technology-related costs should be known to the patient before the telemedicine encounter.
3. Telemedicine technology–Availability of the right equipment, internet connectivity, ease of setup, support, and handholding by the healthcare or technology provider, along with the security, and privacy design of the application, will affect the patient's choice.
4. Ability to share and receive medical records–The patient would like to share historical data and lab reports with the physician as well as be able to receive any medication and test orders electronically.

5. Seamless experience–The patient would prefer a seamless end-to-end experience, right from scheduling a telemedicine consultation to post-consultation fulfillment, instead of having to work on different devices with different providers. This underlines the importance of having interoperable technology systems that allow the exchange of data.

For the physician or a healthcare organization choosing a telemedicine application, it is important that the solution be intuitive, easy, and convenient to use for all aspects of the practice and be integrated with any other digital applications that are being used, such as electronic medical records, practice management systems, and hospital information systems. The cost of setting up and maintaining a telemedicine system is a huge factor in its adoption by a healthcare provider. And finally, there would also be concerns about the security and privacy of health data as well as regulatory compliances.

In essence, the successful adoption of any telemedicine solution depends on whether it is easy to use, affordable, and ensures health data privacy and security from the perspective of both the healthcare provider and the care recipient. Due to these concerns, technology providers are chasing a moving target when it comes to telemedicine and are expected to constantly build-iterate-learn and improve their solutions.

Technology Requirements for Telemedicine in Dementia Care

Telemedicine can be videoconferencing or telephone-based. It can also be held in real-time or asynchronously. Any basic telemedicine practice will require a secure internet connection, a video/audio platform, and technology support in terms of suitable hardware at both the provider and patient end. Additional equipment, like cameras, recording devices, printers, etc., may be used at the discretion of the users.

Telemedicine and the Elderly

The elderly population in the world is growing and has a unique set of challenges. The elderly tend to suffer from restricted mobility, hearing, and visual impairment, as well as memory and cognitive issues. Many of them may not have the support of family and friends or even the means to be able to afford high-cost health services. Also, they are often not comfortable with using technology, which, to many of them, does not go beyond a smartphone and basic use of social media. They tend to trust the traditional face-to-face interactions with their physicians vis-à-vis a remote video-based consultation.

The fact that the elderly often become restricted in terms of mobility and means of travel and suffer from chronic lifestyle disorders that require periodic reviews by physicians makes them the most suitable cohort for telemedicine. Thus, telemedicine solutions need to be tailormade to address the limitations that are specific to the elderly population, such as technological challenges, cognitive disabilities, and visual or hearing impairments.

Growing Burden of Dementia

Dementia is defined as a loss of cognitive functions that include the ability to think, remember, and reason, and to such a degree that it interferes with the normal conduct of a person's daily life and activities [1]. About one-third of the world's population that is aged 85 or above may suffer from some form of dementia [1]. Elderly people suffering from dementia require constant support and care to manage their quality of living, social isolation, and other age-related health issues.

As per the Alzheimer's Association statistics for the US, more than six million people are suffering from Alzheimer's dementia as of date, and this number is expected to increase to 13 million by 2050. Today, every one out of three elderly dies from dementia, and the recent pandemic of COVID-19 caused an almost 17% increase in dementia-related deaths. There was a significant reduction in dementia-related consultations and rehabilitation services due to social distancing norms, the need to protect the elderly from getting infected, and the overburdening of healthcare facilities with COVID-19-related care [2].

In terms of healthcare costs, an estimated $321 billion will be spent on dementia-related care in 2022, which will increase to $1 trillion by 2050. Furthermore, dementia caregivers put in nearly 16 billion hours of care in 2021, and almost 11 million out of these caregivers provided unpaid care [3]. These statistics are ample evidence of the growing burden of dementia, which will have to be managed effectively without compromising acute, chronic, and emergency healthcare related to other diseases.

Dementia Care and Telemedicine

Dementia presents a range of symptoms that may include having difficulty with everyday tasks, repeating conversations, finding it difficult to communicate, getting confused about time, place, and person, and getting lost. There is no definitive cure for dementia. Rather, dementia care, along with some pharmacological measures, comprises a vast range of services, including cognitive assessments, physician consultations, cognitive and behavioral therapies, assisting the patient with daily activities, helping them deal with isolation and depression, preventing and handling emergencies while also taking care of other disabilities and disorders that the patient may suffer from.

In recent years, telemedicine has proven to be an effective means of providing dementia-related care and education, especially to those who do not have dementia expertise in their vicinity and are unable to travel or live in rural areas [4]. The range of services includes cognitive assessments for diagnosing dementia, doctor consultations, the initiation and management of medication, health education, connecting patients and caregivers to support groups, exercise sessions, and wearable devices, as well as online education to caregivers delivered through video calling and other real-time or on-demand technologies [4, 5]. Employing telemedicine in dementia care has helped manage symptoms and issues before a crisis develops, improved quality of life, and reduced patient and caregiver stress and anxiety, emergency department visits, and costs associated with dementia care [4].

Furthermore, a variety of programs have been developed to assist in dementia care. Care ecosystem program by the University of California, San Francisco has the concept of care team navigators (CTNs) who are trained in dementia care. The CTNs use videoconferencing and telephonic conversation to

coordinate care with doctors, nurses, pharmacists, and social workers to educate and support the caregivers, as well as connect caregivers to community resources for advance care planning.

Additionally, Tele-Savvy program run by Emory University provides caregiver training through weekly videoconferencing and daily short video lessons, which can be viewed in their own time. Also, MOVING Together is a program run by the University of California, San Francisco, in collaboration with National Institute of Ageing and Veterans Administrative Support. It provides mindful movement classes for patients and their caregivers.

Caregivers also play an important role in dementia care, be it paramedical staff, nursing home, or home-based care providers, family, or friends. Since the patient suffers from varying levels of cognitive impairment, the caregivers essentially act as a bridge between the healthcare provider and the patient while taking care of their day-to-day activities as well as physical, mental, and social well-being. They also perform the ever-important task of preventing emergencies by detecting any early signs of dementia in the patient. Caregivers have their own set of challenges, and some of them may experience anxiety while imparting dementia care on a long-term basis. The ability and attitude of a caregiver with regard to technology become a significant factor in the adoption of telemedicine. Since caregivers are an inherent part of dementia care, their training, education, and continued support are important facets of dementia management.

Use of Telemedicine During the COVID-19 Pandemic

During the COVID-19 pandemic, the focus of an overstretched healthcare system shifted away from elective procedures, chronic disease management, and geriatric care to managing the onslaught of patients suffering from COVID-19 infection. Outpatient departments closed, and non-COVID-19 inpatient admissions were reduced drastically for want of capacity as well as fear of patients acquiring COVID-19 infection while getting admitted for an unrelated problem or procedure. Lockdowns and social distancing made it difficult for people to travel, and the sheer volume of COVID-19 patients reduced the availability of specialists for non-emergency and remote care.

Patients suffering from dementia and related mental disorders face reduced in-person mental health support and social care delivery with increased social isolation, loneliness, and physical and cognitive decline [6]. Consequently, the use of telemedicine for dementia care in many new ways increased significantly, as healthcare providers and caregivers had no other options available to continue supporting their patients. Regulations related to reimbursement of telemedicine visits were brought in, albeit in a piecemeal and fragmented manner. Newer programs and technologies were built by innovators to meet the need of the hour.

PAST LITERATURE ON THE USE OF TELEMEDICINE DURING THE COVID-19 PANDEMIC

Strategies for Effective Use of Telemedicine

The following have been identified as significant behavioral predictors for the use of home-based telemedicine by older adults [7].

Perceived usefulness–the degree to which the quality of life will improve

1. Effort expectancy–how easy will it be to use the system.
2. Social influence–influence of important others on the older adult. Affordability and technological support facilitate the use of telemedicine.
3. Computer anxiety–anxiety while using technology.
4. Perceived security–how accurate and dependable the system is.
5. Doctor's opinion–does the doctor recommend the system.

Some strategies for the effective use of telemedicine suggested in [8] include:

1. Requisite electronic equipment can be loaned to the patient.
2. Healthcare providers can assist in equipment setup, orientation, and trial runs prior to the actual consultation.
3. Caregivers can reduce the clutter and background noise, thereby making the patient feel safe and comfortable.
4. A backup plan should be in place in case the session fails due to connectivity issues (e.g., telephonic conversation or home visit by staff).
5. Real-time assistance should be provided through telemedicine solutions and telephones that provide three-way or conferencing capabilities.
6. For patients with hearing disabilities, providers should use captioning that uses automatic speech recognition, keeps visits short, and delivers material to the patient or caregiver to review.
7. For patients with visual disabilities, providers can use electronic magnification, text-to-speech technology, better lighting, and a reduction in screen glare.
8. From the technological perspective, there should be the use of integrated headsets, speakers, or personal sound amplifiers that can be adjusted to the needs of a patient with hearing loss, and the default use of automatic speech recognition based on closed captions, etc.
9. There should be specialized training for support staff in communicating with adults suffering from sensory impairment.

Input from patients and their care partners should be taken in order to improve and develop better technologies.

Improvements in Care with Telemedicine

Telemedicine has been relatively successful in dementia care for routine care, cognitive assessments, and rehabilitation [8]. Additionally, it was conducted a study amongst 60 adults suffering from neurocognitive disorders and revealed that videoconferencing-based telemedicine rather than telephone-only consultations led to improved well-being and resilience in the patients and their caregivers [9].

Barriers to Care with Telemedicine

However, although telemedicine has yielded benefits, there have been noted barriers to access and use. Kruse and Heinemann examined the barriers to telemedicine in the general population during COVID-19 [10]. They argued that the adoption of telemedicine during the first year of COVID-19 revealed many common barriers, including a lack of technical literacy, insufficient technology development and availability, and a decrease in patient preference. [10] The other factors included cost, connectivity, confidentiality, and security concerns, health literacy, limits of reimbursement for telemedicine by insurance companies, and lack of personal desire [10].

Additional barriers to telemedicine related to older adults, irrespective of whether they have a cognitive impairment, can be related to their uneasiness using telemedicine due to factors related to technology, such as difficulty in navigating devices with widgets and the use of a computer mouse, the small size of a smartphone, small fonts, unusual characters, bland graphics, poor color contrast, and crowded menu bars [11]. Furthermore, the adoption of technology-enabled dementia healthcare requires overcoming barriers related to availability and familiarity with technology, an adaptation of clinical practice guidelines and communication methods, and adequate support from caregivers [6]. Factors such as lack of interpersonal connection in a virtual interaction, anxiety due to newer methods of interaction, and confusion between live and pre-recorded sessions also act as barriers to effective usage [6].

Furthermore, a cross-sectional study conducted in [12] amongst 4,525 medicare beneficiaries aged 65 and above revealed that almost 72% of these adults were unready for the use of telemedicine. 38% were not ready for video consultation due to a lack of experience with using technology. Of those who had caregivers or assistance with using technology, 32% were still not ready for video consultations and preferred the telephone. Approximately, 20% were unready for telephonic visits, too, due to hearing, speech, and cognitive disabilities. The study recommended that telemedicine devices be made a medical necessity for the elderly and suitable accommodations for disabilities (for example, captioning of videos) be done [12].

Another study published in the Canadian Medical Association Journal in March 2021 identified the following barriers to the effective use of telemedicine in COVID-19 [5].

1. Technology-related factors–Lack of equipment, lack of connectivity, limited digital literacy, patient or family resistance, and sensory impairment in the patient
2. Doctor-patient alliance–Discomfort with reduced interpersonal engagement and susceptibility to breaches of security and privacy owing to digital transmission in an unregulated home environment.
3. Diagnostic challenges–Inaccuracies could occur due to the nonstandard conditions, limitations of tele neurology, and difficulty in adapting paper-based cognitive assessment tests to virtual platforms.
4. COVID-19 pandemic-related factors–Increase in behavioral and psychological symptoms of dementia (BPSD) and reduced availability of caregivers to facilitate telemedicine.

Purpose of the Study

As demonstrated in the literature, the COVID-19 pandemic created a situation, where many healthcare providers, dementia patients, and their caregivers had no option but to use telemedicine. This manifold increase in the use of telemedicine for dementia care provided a golden opportunity to gain useful insights into what worked and what did not in dementia-care-related telemedicine. Keeping in view that dementia patients would be suffering from varying degrees of cognitive impairment, it was decided to obtain the caregiver's perspective on the subject, as they would be able to give feedback from the technology and health informatics perspective.

The identification and analysis of barriers to the adoption of telemedicine during the COVID-19 pandemic would help pave the way for future improvements and innovations in not only technology but also the processes within healthcare systems. This would help achieve effective, efficient, and safe delivery of dementia-care-related telemedicine services.

MATERIALS AND METHODS

The research question formulated for this study was as follows: "Did technology-related factors, participant abilities, participant attitudes, and cost act as barriers to effective use of telemedicine for dementia care during the COVID-19 pandemic?"

The six hypotheses that were tested during the study were as follows:

1. **Null hypothesis 1**–Technology-related factors have no effect on the usage of dementia care-related telemedicine.
2. **Alternative hypothesis 1**–Lack of suitable technology is a barrier to the usage of dementia care-related telemedicine.
3. **Null hypothesis 2**–Digital literacy has no effect on the usage of dementia care related telemedicine.
4. **Alternative hypothesis 2**–Lack of digital literacy is a barrier to the usage of dementia care-related telemedicine.
5. **Null hypothesis 3**–Sensory/cognitive impairment of the patient has no effect on the usage of dementia care-related telemedicine.
6. **Alternative hypothesis 3**–Sensory/cognitive impairment of the patient is a barrier to the usage of dementia care-related telemedicine.

7. **Null hypothesis 4**–A participant's attitude towards technology has no effect on the usage of dementia care-related telemedicine.
8. **Alternative hypothesis 4**–A participant's discomfort with technology is a barrier to the usage of dementia care-related telemedicine.
9. **Null hypothesis 5**–Security and privacy concerns have no effect on the usage of dementia care related telemedicine.
10. **Alternative hypothesis 5**–Security and privacy concerns are a barrier to the usage of dementia care-related telemedicine.
11. **Null hypothesis 6**–Cost has no effect on the usage of dementia care-related telemedicine.
12. **Alternative hypothesis 6**–Cost is a barrier to the usage of dementia care-related telemedicine.

Approach

The research methodology used for this paper was a mixed-method approach wherein quantitative analysis was carried out to test the hypothesis. Additionally, some qualitative analysis was also performed to understand the human angle of telemedicine in dementia, such as participant attitudes. The rationale behind choosing a mixed approach was to not only validate the known barriers but also obtain insights on hitherto unknown or unacknowledged barriers to dementia care-related telemedicine.

Research Instrument

Since the study was retrospective and there was no observational data available, the research instruments considered were interviews, focus groups, and surveys. Conducting one-to-one interviews was not possible for a large sample of the population, and similarly, getting participants in groups to carry out discussions would not have been very time and cost-effective. Hence, it was decided to use the survey tool as the research instrument.

Design

A survey (both online and paper-based) was carried out on the subject among dementia caregivers. The survey was anonymous for the purposes of information security and honesty of the participants. It had closed questions for quantitative aspects of research, and statistical analysis of the responses was carried out. There was an open-ended question to probe into the perceived barriers as well as collect suggestions on improving the utilization of dementia related telemedicine.

Distribution

The online survey was hosted through SurveyMonkey on March 8, 2022, at URL https://www.surveymonkey.com/r/5C3T3GC. The paper-based survey was conducted at the following sites:

1. Main study site: Alzheimer's MS, 855 S. Pear Orchard Rd. Ridgeland, MS 39157.
2. Off-campus study sites: Our Time Adult Day Care Services, 350 W Woodrow Wilson Ave, Suite 300, Jackson, MS 39213, and Edmonds Way Adult Family Home, 8029 W Mill Rd, Milwaukee, WI 53218.

Duration

The online survey was kept open from March 8, 2022, to April 27, 2022, after which the collected data was analyzed, and inferences were drawn.

Inclusion and Exclusion Criteria

The survey's respondents included 91 dementia caregivers. Respondents less than 18 years of age were excluded from the survey. Dementia patients were excluded from the survey as it was the caregiver's perspective that was to be captured.

Data Collection and Analysis

The online survey was developed on SurveyMonkey to allow the automatic collection of response data. The paper survey was coded by IBM SPSS 27. Crosstabulation and trends were analyzed. The inputs given via the single open-ended question were collated. Inferences drawn from the survey results were used to recommend possible strategies for increasing the use of telemedicine in dementia care by improving technology, processes, and user abilities.

DISCUSSION

This study was carried out to identify barriers to the usage of telemedicine by dementia caregivers during the COVID-19 pandemic from the caregivers' perspectives. The online survey instrument, which was distributed manually at three sites, consisted of 18 closed questions and one open-ended question. The survey questions were directed at four categories:

1. *Technology*–Availability of equipment, internet connectivity, assistance by healthcare providers in technology setup and enhancement of experience, communication methods used, and the quality of technological experience.
2. *Participant abilities*–Sensory and cognitive impairments, ability to use technology, and training and support for the same, given by the healthcare provider.
3. *Participant attitudes*–Preference for telemedicine vis-à-vis physical visits, comfort with technology, and security and privacy concerns
4. *Cost*–Reimbursement and out-of-pocket expenses

Participants were also asked to suggest how telemedicine for dementia care could be improved. The insights gained from the study were used to make recommendations to improve the usage of telemedicine for dementia care by building better technology, improving the processes and information flow, continually supporting the users, and making telemedicine affordable.

Technology

On analyzing the 91 responses to the survey, it became evident that the availability of equipment and internet connectivity for telemedicine was not a problem, and most of the consultations held were real-time. The quality of the

experience was mostly average and above average. Enhancement aids and features were provided, with headsets/speakers being the commonest. However, support from the healthcare providers during the setup of equipment could improve. Respondents suggested that good customer service through trained personnel, help during initial setup, better connectivity, and upgradation of the systems with time would help improve the telemedicine experience.

Participant Abilities and Attitudes

Almost a third of the respondents said that the patient became anxious during the telemedicine encounter, and telemedicine does not emerge as a clearly preferred choice vis-à-vis a physical consultation, with more than half the respondents saying that it lacked the interpersonal touch. Almost a third also felt that telemedicine put the security and privacy of health data at risk. Respondents asked for more collaboration, solidarity, understanding, and caring for the patient.

Costs

The costs were nil, fully, or partially reimbursed for most of the patients, with less than a tenth having to pay for it fully. However, respondents suggested that it should be made cheaper or entirely free.

The study depicted that telemedicine was indeed used for dementia care during the COVID-19 pandemic. However, technology and cost were not the sole barriers to its usage. What was required to be targeted was the user experience – right from setting up the equipment to post-consultation support. Some of the aspects that emerged as key result areas were, as follows:

1. Technology
    a. High-quality 365×24×7 customer support by the technology provider.
    b. Newer technologies that simulate a physical visit.
2. Training
    a. Formal telemedicine training of healthcare providers, including physicians, to allow them to use telemedicine without compromising patient care and empathy.
    b. Formal telemedicine training of dementia caregivers for ease of setup, use, and troubleshooting.
    c. Formal customer support training.
3. Information and change management
    a. Integrated electronic health records that allow electronic prescriptions and orders.
    b. Compliance with security and privacy regulations for building trust.
    c. Smoother and leaner processes require minimal effort from the user's end.
    d. Change management to encourage user adoption of and adaptation to telemedicine.

Telemedicine Process

It is evident that technologies for telemedicine are only increasing by the day, and more and more healthcare systems are adopting telemedicine for dementia care. However, acquiring and setting up a telemedicine system is merely the first step. The use of telemedicine requires leadership involvement, user training, process refinement, and change management by the healthcare system. But ultimately, the use of telemedicine will still be dictated by the patient.

From the patient's point of view, a single telemedicine visit would involve the following steps:

1. Check if the telemedicine visit is covered by insurance and copays, if any.
2. Check internet connectivity.
3. Set up devices and peripherals (for example, headphones or earbuds).
4. Install a mobile app if required or register on a website.
5. Gather all medical information, including previous records, tests, photographs, if any, and vital measurements (for example, weight, pulse, and blood pressure).
6. Make a list of questions to be asked, including those related to follow-up.
7. Find a discreet space for the session.
8. Join and attend the session.
9. Take all follow-up actions advised during the visit.

In the case of the elderly suffering from dementia or other psychiatric disorders, the preparation for the telemedicine visit would most probably be carried out by the caregiver. However, the patient would still have to attend the session and may face difficulties in being able to see, hear, speak, or understand us, as well as use technology. The patient may feel anxious during the session, or he may feel distrustful of the healthcare provider or the technology itself since he is more accustomed to an in-person consultation. The process of obtaining consent itself becomes complicated for a patient who lacks the capacity to give consent. One such algorithm for obtaining consent adopted from telepsychiatry operational guidelines 2020 is reproduced in **Figure 1** [13].

The 4G/5G spectrum enables faster speed and higher resolution of real-time images and videos. Affordable smartphones and tablets allow patients and healthcare providers to use mobile-based health applications for a variety of services. Live video and audio conferencing, electronic health records, personal health records, and secure email services enable synchronous and asynchronous interactions.

The use of wearables, internet of things (IoT), and remote monitoring equipment allow real-time gathering and monitoring of data. Artificial intelligence (AI) based tools help organize, screen, and analyze such data and inform medical decisions. Availability of secure cloud services and advances in cybersecurity have helped healthcare organizations adopt low-cost, scalable, and inter-connected telemedicine applications and systems (**Figure 2**) [14].

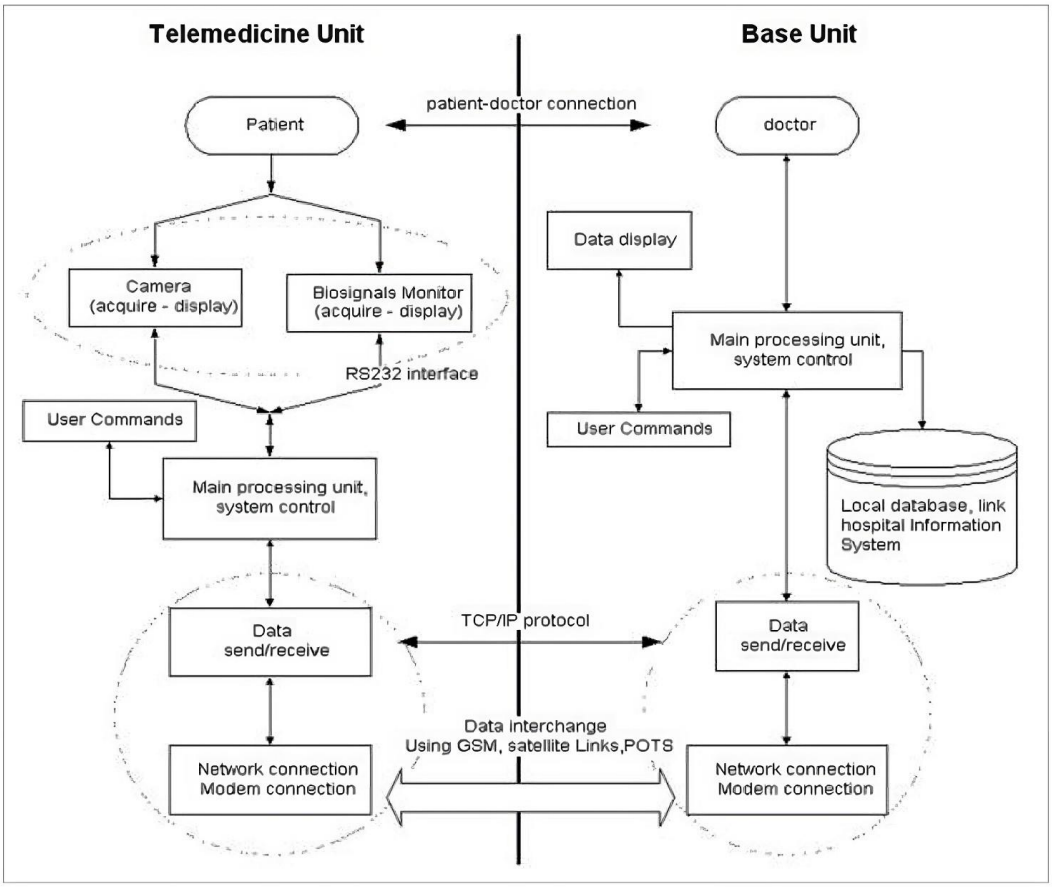

Figure 1. Information flow within telemedicine system [13]

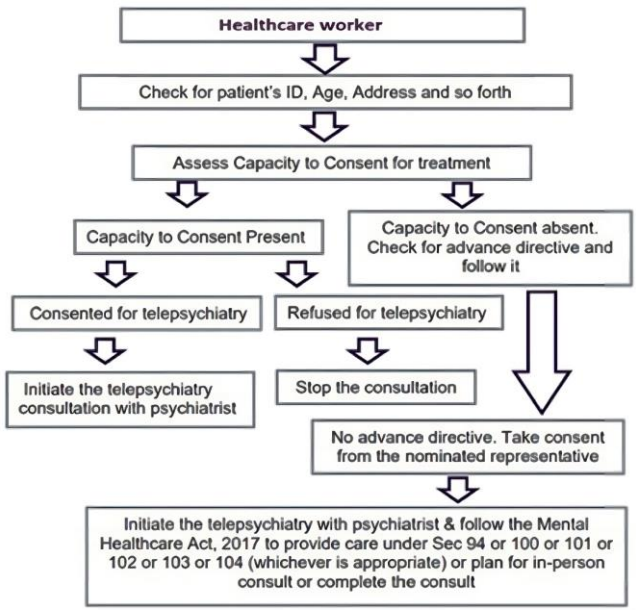

Figure 2. Consulting elderly via telemedicine along with healthcare worker or physician [14]

Factors Affecting Adoption of Telemedicine

It will be safe to presume that merely having the best technology or system is not enough. Telemedicine for dementia care will have to be accessible, affordable, user-friendly, and trustworthy for the elderly and their caregivers to be able to adopt it. The common factors that affect the adoption of telemedicine are enumerated below.

Clinical effectiveness

The relevance of telemedicine as a primary diagnostic or therapeutic tool varies between clinical services. Telemedicine has gained importance in radiology, pathology, dermatology, psychiatry, and mental health services, which essentially require medical decision-making based on the information available. However, for specialties that require a physical examination and contact with patients for imparting treatment, the use of telemedicine may not be very high. Similarly, telemedicine is more likely to be adopted for chronic lifestyle diseases that can be monitored remotely vis-à-vis acute disorders.

Suitability of technology

High-end technology requires a lot of investment but might not be suitable for the patient. For instance, high-quality video equipment may be required for Teleradiology but may not have many benefits in mental health. While the telemedicine center may use the best technology, its use may be limited by the internet bandwidth and quality of electronic devices with the patient. Thus, the telemedicine technology chosen has to be of low cost and high accessibility for successful adoption [15].

Costs and eimbursement

Clear reimbursement rules for telemedicine are very important. High out-of-pocket expenditures dissuade the usage of telemedicine.

Legislations and liability

Validity of medical licenses across states, regulations on liability, and other medicolegal issues are factors that may affect adoption of telemedicine by healthcare professionals.

Organizational factors

For healthcare systems, leadership, cost of acquisition and maintenance, resistance to change, and effectiveness of telemedicine training are factors that may affect the adoption of telemedicine.

Challenges in the elderly

Elderly patients have their unique set of challenges in adopting telemedicine, which include difficulty in hearing, speaking, and seeing, cognitive impairment and dementia, lack of access to internet-enabled devices as well as poor awareness of how to use these devices.

CONCLUSIONS

Telemedicine is an important modality in dementia care as patients tend to be elderly with restricted mobility, sensorimotor impairments, and other chronic disorders. This study analyzed the barriers to the use of dementia care related to telemedicine during the COVID-19 pandemic from the caregivers' perspective. Insights gained from the survey conducted on the subject showed that technology, participant attitudes, and abilities, as well as cost, can act as barriers to the adoption of telemedicine. Assistance given by healthcare providers during technology setup, provision of aids and features enhancement of the experience as well as high-quality customer support services are important factors that could promote adoption. Telemedicine and information security training for healthcare providers, caregivers, and customer support staff should be a mandatory practice. Ensuring secure and smooth management of information flow from providers to patients through integrated electronic or personal health records and wearables, as well as compliance with security and privacy regulations, may improve participant attitudes towards telemedicine. Finally, telemedicine should be explicitly and extensively covered under reimbursement rules to make it affordable to larger sections of society.

In conclusion, telemedicine is here to stay, and all other domains, technology, and service providers will have to continue chasing a moving target, constantly creating, refining, or implementing technologies, training aspects, and processes while keeping costs low.

Author contributions: All co-authors have involved in all stages of this study while preparing the final version. They all agree with the results and conclusions.

Funding: No funding source is reported for this study.

Declaration of interest: No conflict of interest is declared by the authors.

Ethical statement: Authors stated that ethical approval and informed consent were approved by Institutional Review Board Committee at Mercer University where the study was initiated in April 2022, Office of Research Compliance 1501 Mercer University Drive, Macon, Georgia, 31207. Authors further stated that there was no risk anticipated for the participants as they could not be identified, and hence their anonymity would be preserved, and their data was kept securely.

Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

REFERENCES

1. National Institute of Aging. What is dementia? Symptoms, types, and diagnosis. National Institute of Health; 2021. Available at: https://www.nia.nih.gov/health/what-is-Dementia (Accessed: 22 May 2023).
2. Alzheimer's Association. Alzheimer's disease facts and figures. Alzheimer's Association; 2022. Available at: https://www.alz.org/alzheimers-Dementia/facts-figures (Accessed: 22 May 2023).
3. Cohen G, Russo MJ, Campos JA, Allegri RF. Living with dementia: Increased level of caregiver stress in times of COVID-19. Int Psychogeriatr. 2020;32(11):1377-81. https://doi.org/10.1017/S1041610220001593 PMid: 32729446 PMCid:PMC7453351
4. National Institute of Aging. Telehealth: Improving dementia care. National Institute of Health; 2020. Available at: https://www.nia.nih.gov/news/telehealth-improving-Dementia-care (Accessed: 22 May 2023).
5. Gosse PJ, Kassardjian CD, Masellis M, Mitchell SB. Virtual care for patients with Alzheimer's disease and related dementia during the COVID-19 era and beyond. CMAJ. 2021;193(11):E371-7. https://doi.org/10.1503/cmaj.201938 PMid:33722828 PMCid:PMC8096398
6. Quail Z, Bolton L, Massey K. Digital delivery of non-pharmacological intervention programmes for people living with dementia during the COVID-19 pandemic. BMJ Case Rep. 2021;14(6):e242550. https://doi.org/10.1136/bcr-2021-242550 PMid:34140328 PMCid:PMC8212172
7. Cimperman M, Brenčič MM, Trkman P, Stanonik M. Older adults' perceptions of home telehealth services. Telemed J E Health. 2013;19(10):786-90. https://doi.org/10.1089/tmj.2012.0272 PMid:23931702 PMCid:PMC3787386
8. Yi JS, Pittman CA, Price CL, Nieman CL, Oh ES. Telemedicine and dementia care: A systematic review of barriers and facilitators. J Am Med Dir Assoc. 2021;22(7):1396-402.e18. https://doi.org/10.1016/j.jamda.2021.03.015 PMid:33887231 PMCid:PMC8292189
9. Lai FH, Yan EW, Yu KK, Tsui WS, Chan DT, Yee BK. The protective impact of telemedicine on persons with dementia and their caregivers during the COVID-19 pandemic. Am J Geriatr Psychiatry. 2020;28(11):1175-84. https://doi.org/10.1016/j.jagp.2020.07.019 PMid:32873496 PMCid:PMC7413846
10. Kruse C, Heinemann K. Facilitators and barriers to the adoption of telemedicine during the first year of COVID-19: Systematic review. J Med Internet Res. 2022;24(1): e31752. https://doi.org/10.2196/31752 PMid:34854815 PMCid:PMC8729874

11. Foster MV, Sethares KA. Facilitators and barriers to the adoption of telehealth in older adults: An integrative review. Nursing Center; n. d. Available at: https://www.nursingcenter.com/ce_articleprint?an=00024665-201411000-00003 (Accessed: 22 May 2023).
12. Lam K, Lu AD, Shi Y, Covinsky KE. Assessing telemedicine unreadiness among older adults in the United States during the COVID-19 pandemic. JAMA Intern Med. 2020;180(10):1389-91. https://doi.org/10.1001/jamainternmed.2020.2671 PMid:32744593 PMCid:PMC7400189
13. Kyriacou E, Pavlopoulos S, Berler A, et al. Multi-purpose HealthCare telemedicine systems with mobile communication link support. Biomed Eng Online. 2003;2:7. https://doi.org/10.1186/1475-925X-2-7 PMid:12694629 PMCid:PMC153497
14. Kalaivanan RC, Rahul P, Manjunatha N, Kumar CN, Sivakumar PT, Math SB. Telemedicine in geriatric psychiatry: Relevance in India. Indian J Psychol Med. 2021;43(5_suppl):S121-7. https://doi.org/10.1177/02537176211033007 PMid:34732964 PMCid:PMC8543607
15. Perednia DA, Allen A. Telemedicine technology and clinical applications. J Am Med Assoc. 1995;273(6):483-8. https://doi.org/10.1001/jama.1995.03520300057037