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THE ROLE OF TELEMEDICINE TECHNOLOGY IN THE CARE OF STROKE PATIENTS

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Technology; Telemedicine; Stroke

ABSTRACT
Technological advances in the health sector are one of the factors in meeting optimal health, especially in places that provide health services. The use of technology in helping health services is one of the uses of telemedicine technology in treating stroke patients. This writing aims to discover the role of telemedicine technology in the care of stroke patients. The research method used in this study is descriptive-analytical. The study was conducted to analyze selected literature from various sources, which will later become a new idea related to the role of telemedicine technology in the care of stroke patients. The results of this study show that Telemedicine is considered very important for handling and providing therapy to patients, which is undoubtedly supported by the correct diagnosis. Telemedicine with health interventions through the capabilities of information technology, either smartphones or other wireless networks, extensively provides benefits and opportunities for the world of health to have a good influence in improving the quality of life of patients with stroke.

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INTRODUCTION

Health is essential and desired by every human being because health is a state of physical, mental, and social well-being that allows every person to live a productive life socially and economically. Health must be viewed as an investment to improve the quality of human resources. Health is one of the main components in measuring the Human Development Index.

The health need is the main thing (Manurung, 2021). There are still many health problems in Indonesia, including non-communicable diseases requiring long-term treatment (Kausar, 2019). The disease that many Indonesian people suffer from is stroke. Stroke is a condition that occurs when the blood supply to the brain is disrupted due to a blockage (ischemic stroke) or rupture of a blood vessel (hemorrhagic stroke). This condition causes parts of the body controlled by the damaged area of the brain not to function correctly (Nurfallah, 2021). This disease causes disability in the form of paralysis of the limbs, speech disorders, and thought processes due to impaired brain function.

Stroke or CVD is a sudden neurological deficit in the central nervous system caused by ischemic or hemorrhagic events with a multi-complex etiology and pathogenesis (Fitriani & Mulyono, 2022). One of the causes of stroke is high blood pressure. The higher the blood pressure, the greater the amount of vascular damage, which can trigger blood vessels to burst (Nurfallah, 2021). According to the World Health Organization (WHO), in 2018, stroke was one of the leading health problems in the world. Stroke is the third leading cause of death.

The incidence of stroke is not yet known with certainty. However, several journals state that a poorly treated stroke can worsen the patient's condition (Magda et al., 2023). Realizing that health

services are a need for every citizen, the government occasionally strives to produce programs that can improve health services as a whole, including by utilizing existing technology (Ma'mur & Ahmad, nd).

Therefore, a breakthrough is needed to overcome strokes, which often occur today. Technology is essential to help speed up the healing and treatment of patients, especially strokes. One thing nurses give to patients and the development of information technology in the field of nursing that is widely applied is Telemedicine.

Along with increasingly advanced developments in science and technology, Telemedicine is emerging as an innovation in health services. Telemedicine as part of telehealth is an essential component of the future of health services (Andrianto & Fajrina, 2021). Telemedicine expands access to health services for patients in urban and rural areas. Telemedicine has many clinical benefits, including remote monitoring and offering telehealth services to residents.

However, with the many benefits of Telemedicine, there are also many limitations. The most significant limitations are economic, regulatory, and technical issues. Telemedicine is one of the most essential strategies to reduce the pandemic's increasing rate by implementing social distancing (Ahmad et al., 2021). This is where Telemedicine plays a role in helping and supporting the healthcare system, especially in public health, prevention, and clinical practice. Significant advances in Telemedicine are designed to help address this pandemic and demonstrate how the emergence of Telemedicine can transform the preparedness infrastructure of healthcare systems. Currently, the main effort in Telemedicine is in diagnosing and monitoring physiological dysfunction.

This study aimed to assess the effectiveness of telemedicine technology in the treatment of stroke patients. This includes evaluating the extent to which telemedicine can assist in early diagnosis, treatment, and monitoring of patients, as well as their impact on clinical outcomes.

METHOD

The research method used in this research is analytical descriptive with the type of data used in the form of secondary data obtained from literature studies, in the form of materials from journals, magazines, websites, books, etc. Connected to the phenomena that occur. The data collection tool used in this research is a document study. The data analysis method used is a qualitative data analysis method. The study was conducted to analyze literature selected from various sources, which will later become a new idea related to the role of telemedicine technology in the care of stroke patients.

RESULTS AND DISCUSSION

Stroke or CVD

Stroke or CVD is a sudden neurological deficit in the central nervous system caused by ischemic or hemorrhagic events with a multi-complex etiology and pathogenesis. Stroke is the leading cause of physical or mental disability in old age and productive age. With its characteristics, stroke is a severe problem worldwide (Fitriani & Mulyono, 2022).

According to the Minister of Health Nila F. Moeloek (January 6, 2016), stroke and traffic accidents were the biggest causes of death 2015. Meanwhile, infectious diseases such as tuberculosis were ranked sixth, preceded by ischemic heart disease, cancer, and diabetes mellitus (Muhammad Wali et al ., 2023). Stroke is the second cause of death and the third cause of disability worldwide. According to WHO, stroke is a condition where rapidly developing clinical signs are found in focal and global neurological deficits, which can be severe and last for 24 hours or more, causing death (Mahmudah, 2014). Strokes that result in paralysis and require further treatment, which, of course, requires quite a long time and quite a lot of money (Kausar, 2019).

In 2019, stroke was ranked first among the ten causes of death and disability in Indonesia, sourced from healthdata.org (Li & He, 2022), and the highest risk factor for death and disability was caused by high blood pressure (Li & He, 2022). Stroke severity is the main predictor of health utility value (Du et al., 2018). Many complications can affect daily living activities in stroke sufferers, and this can increase death rates. So, implementation is needed to improve the quality of life, including reducing depression rates (Widiyanto et al., 2022). Stroke is the main trigger for long-term disability. The high rate of disability due to stroke is caused by disruption of cerebral tissue, resulting in the inability to carry out daily activities, mental and emotional disorders, and decreased productivity (Fitriani & Mulyono, 2022).

Stroke is a neurological function disorder caused by disruption of blood flow to the brain, which can arise suddenly or quickly with symptoms or signs that correspond to the brain's disturbed area. Stroke sufferers require long-term treatment, and medical costs are very high; the problem of decreased patient productivity compounds this. Stroke is a neurological emergency, with mortality and morbidity increasing yearly (Lisiswanti & Putra, 2016).

Stroke is Korea's third leading cause of death after cancer and heart disease. It has become the leading cause of death in developed countries such as the United States and Europe. Two-thirds of patients survive, but most have severe disabilities, requiring comprehensive rehabilitation therapy to recover from neurological damage and loss of function. Stroke is a leading cause of long-term disability; only a quarter of patients recover sufficiently to lead independent lives.

Therefore, stroke is a disease that requires severe treatment, and preventive measures are needed for society because of the severe economic and social impacts caused by this disease. The public health burden of stroke is expected to increase over the coming decades due to the demographic transition of populations, especially in developing countries (Donkor, 2018).

The clinical symptoms of stroke depend on the area of the brain where blood flow is disturbed and the function of the brain area where blood flow is disturbed. Clinical manifestations, in general, are paralysis on one side of the body, impaired feeling on one side of the body, disturbed speech or not being able to speak or not understanding speech, swallowing disorders, slanted mouth, balance problems, visual disturbances to decreased consciousness, then post-stroke can occur, including epilepsy, dementia or forgetfulness, and depression. The incidence of stroke is that one person suffers a stroke every minute, and almost 20 people die every hour.

The clinical picture of stroke includes:

1. Infarction of the central nervous system Signs and symptoms of arterial infarction depends on the vascular area affected:
    1) Total infarction of the anterior (carotid) circulation: hemiplegia (damage to the upper part of the corticospinal tract), hemianopia (damage to the optic radiation). Cortical deficits include dysphasia (dominant hemisphere) and loss of visuospatial function (non-dominant hemisphere).
    2) Partial infarction of anterior circulation: hemiplegia and hemianopia, cortical deficit only.
    3) Lacunar infarction: intrinsic disease (lipo hyalinosis) of the small deep arteries causes a characteristic syndrome.
    4) Posterior (vertebrobasilar) circulation infarction: signs of brainstem lesion, homonymous hemianopsia. e. Spinal cord infarction.
2. Transient ischemic attack (TIA = transient ischemic attack) A typical sign of TIA is a sudden loss of focal CNS function; symptoms such as syncope, confusion, and dizziness are insufficient to establish a diagnosis. TIA generally lasts only a few minutes, rarely lasting hours.
3. Hemorrhagic subarachnoid hemorrhage (SAH) Due to irritation of the meninges by blood, the patient shows symptoms of sudden (within seconds) very severe headache accompanied by photophobia, nausea, vomiting, and signs of meningismus (stiff neck and dry signs). In heavier bleeding, intracranial increase and disturbance of consciousness can occur. On fundoscopy, papilledema and retinal hemorrhage can be seen. Focal neurological signs may occur due to the false localization effect of increased intracranial pressure, concomitant intracerebral hemorrhage, and spasms of blood vessels due to the irritant effect of blood together with ischemia.

4. Spontaneous intracerebral hemorrhage Patients present with focal neurological signs depending on the location of the hemorrhage, seizures, and features of increased intracranial pressure. The diagnosis is usually apparent from a CT scan.

Thus, to prevent these aspects from worsening, all acute stroke sufferers must be monitored continuously for their general condition, brain function, ECG, oxygen saturation, blood pressure, and body temperature for 24 hours after the stroke.

The Role of Telemedicine Technology in Stroke Patient Care

The term Telemedicine comes from the words "Tele," a Greek word meaning "distance," and "modern," is a Latin word meaning "to heal." Although initially considered "futuristic" and "experimental," Telemedicine has become a reality. It is being implemented in various parts of the world. Telemedicine has various application aspects, namely, providing health services to patients, educational purposes, research, administration, and public health (Andrianto & Fajrina, 2021). The World Health Organization (WHO) states that the term Telemedicine‖ was first coined in 1970, which means distance healing. WHO defines Telemedicine as The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities (Andrianto, 2021).

Thus, Telemedicine is the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies to exchange valid information for diagnosis, treatment, and prevention of disease and injury, research and evaluation, and education. Sustainable. Healthcare providers, all in the interest of advancing the health of their individuals and communities. The application of Telemedicine in Indonesia is new. In 2016, telemedicine applications emerged and began to develop. Then, the COVID-19 pandemic, which entered Indonesia in March 2020, increased public interest and the need for health services via Telemedicine (Andrianto & Fajrina, 2021). Telemedicine is a feasible and safe method for providing health services (Batubara et al., 2021). One of the main components of neurosurgical telemedicine services that differs from Telemedicine in general is the importance of evaluating and diagnosing disease, especially for new patients and cases of suspected stroke (Moazzami et al., 2020).

Terms such as Telemedicine are used interchangeably to refer to services using electronic technology for patients over distance limitations. In its application, telehealth is beneficial in fulfilling health welfare for patients and families (Utama et al., 2023). Telemedicine is a long-distance health service through the use of communication and information technology that can provide health service solutions for remote areas where health facilities are inadequate (Ariyanti & Kautsarina, 2017). With Telemedicine, health workers can find out directly about the client's clinical condition without having to meet face to face so that they can provide appropriate interventions or health services that suit the client's condition (Manurung, 2021). The application of Telemedicine in Indonesia is new. In 2016, telemedicine applications emerged and began to develop. Then, the COVID-19 pandemic, which entered Indonesia in March 2020, was one of the factors in the increase in public interest and need for health services via Telemedicine. Telemedicine is an alternative for providing health services that minimize direct contact between doctors and patients to reduce the rate of COVID-19 transmission.

Pathophysiologically, stroke occurs due to ischemia or hemorrhage in cerebral blood vessels, contributing to high mortality and morbidity rates. High morbidity rates have implications for expensive rehabilitation costs and high dependency rates (Purnamayanti et al., 2020). Stroke can affect a patient's life in physical, emotional, psychological, cognitive, and social aspects. The level of physical and mental disability in post-stroke patients can affect the patient's quality of life (Fitriani & Mulyono, 2022). Health information technology can improve communication between patients and health workers, share information, and support decision-making (Pudiyanti & Afriani, 2020). The current telemedicine health service model provides valuable experience for countries with limited resource conditions. This is the right motivation to accelerate the implementation of telemedicine services.

Three types of telemedicine services exist: synchronous, asynchronous, and remote monitoring. Synchronous monitoring refers to the delivery of health information in real time. This allows for

direct discussions with patients and doctors to provide medical services. Another type of live (or synchronous) telemedicine visit is the Facilitated Virtual Visit. An example of a facilitated virtual visit occurs when the patient is in an accessible location, i.e., a clinic where diagnostic equipment is available, and the medical provider is at a distance. Here, a telefacilitator (i.e., medical assistant or nurse) collects objective measures using equipment (i.e., digital stethoscope, thermometer, pulse oximeter, and so on) and transmits this data to the provider. Asynchronous Telemedicine refers to the "store-and-forward" technique.

The patient or doctor collects medical history, images, and pathology reports and then sends them to specialists for diagnostic expertise and treatment. Lastly, remote patient monitoring involves ongoing evaluation of the patient's clinical status, either through live video monitoring of the patient or through a review of tests and images collected remotely. Newer technologies like mobile device applications enable broader telehealth possibilities (Fatmawati & Keb, 2021). The scope and benefits of Telemedicine cover three interrelated sides: patients, doctors, and hospitals. The specific direct benefits for patients are:

1. Accelerate patient access to referral centers
2. It is easy to get help while waiting for direct help from private doctors
3. Patients feel they remain close to home, where family and friends can provide direct support
4. Reducing mental stress or tension felt at work
5. They are selecting patients who need to be taken to the hospital. Patients who do not need hospital treatment will still stay at home.

Another benefit obtained from Telemedicine is felt by patients, nurses, and other health workers because, in this case, it will make monitoring the patient's condition easier. Telemedicine makes it easier for health workers to reach patients for education related to patient education to improve the quality of life of stroke patients. This is shown by the long-distance telephone, SMS, and social media methods. It is also easier for patients to obtain information related to education to improve the quality of life of stroke patients through Telemedicine.

Telemedicine hardware and software are costly, but it is necessary to explain which side can be applied according to our capabilities and which must wait for high technology. All imaging (image) delivery, real-time echocardiography, X-ray film imaging, CT scans, or angiograms require high costs for broadband channels and digital networks.The choice of telecommunications access has spurred the interest of many healthcare centers in using Telemedicine for more effective services. Recent research has demonstrated the diagnostic accuracy of echocardiography in pediatric patients performed in real-time using broadband microwave and store and forward using standard telephone lines. The level of accuracy and clarity of the image is so high that it has encouraged heart health centers to develop telecardiology networks to serve patients in suburban areas or small towns.

CONCLUSION

Based on the research results and discussion above, the role of Telemedicine is considered very important for treating and providing therapy to patients, which, of course, is supported by an appropriate diagnosis. Making a correct diagnosis via Telemedicine is a challenge for doctors because a solid ability to explore the patient's anamnesis and medical history is essential. Hospitals in Indonesia have creativity and can adapt to changing times to compete in improving patients' quality of life. Even though there are still many obstacles that need to be studied further on how to handle them, such as the absence of palpation of the patient, supporting examinations such as radiology still have to be in place, through this systematic review, Telemedicine shows its advantages in terms of ease in diagnosing diseases such as stroke. Telemedicine with health interventions through information technology capabilities, whether smartphones or other wireless networks, provides benefits and opportunities for the world of health to have a good influence in improving the quality of life of patients with stroke.

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