INTEREST: Jurnal Ilmu Kesehatan
Vol. 11, No. 2, November 2022
https://doi.org/10.37341/interest.v0i0.415

Systematic Review

The Effectiveness Of Telemedicine To Improve Quality Of Life For Patients In The COVID-19 Pandemic

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ABSTRACT

Background: *COVID-19 delivers the effects of health services in form. Health services began to enforce health protocols, especially social distancing. Medical consultations carried out during medical visits become remote medical consultations by maximizing electronic health technology (e-health), telehealth, and/or telemedicine. The use of health technology has increased research on telemedicine's effectiveness on patients' health-related quality of life (HRQoL). The aim of this study is to analyze the effectiveness of telemedicine in improving the quality of life of chronic disease patients that require regular visits to health providers during the COVID-19 pandemic during Covid-19 Pandemic.*

Methods: *The research was descriptive.* A systematic review with source data from *Pubmed, ScienceDirect, and Sage databases with the keyword "COVID-19 and telemedicine and health-related quality of life". Criteria were limited to all clinical study articles published during the COVID-19 pandemic in Indonesian or English and published during the COVID-19 pandemic.*

Results: *Eleven (11) articles were successfully selected. Telemedicine was used for kidney transplantation or minor stroke patients, amyotrophic lateral sclerosis (ALS), cancer, adrenal insufficiency, chronic obstructive pulmonary disease (COPD), and primary antibody deficiency patients. The instruments used to measure HRQoL were generic (the EQ-5D and SF-36) and specific for some diseases. The results showed that telemedicine could maintain HRQoL and reduce depression or anxiety.*

Conclusion: *Telemedicine is a feasible and effective intervention to maintain HRQoL and reduce the consequences of social distancing during the COVID-19 pandemic. The recommendation is telemedicine must continue to be developed in health services even though the COVID-19 pandemic is over.*

ARTICLE HISTORY
Received: February 7th, 2022
Accepted: December 28th, 2022

KEYWORDS
covid-19, HRQoL, telemedicine;

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Cite this as: Sayuti, N. A., & Atikah, N. .-. (2022). The Effectiveness Of Telemedicine To Improve Quality Of Life For Patients In The COVID-19 Pandemic. *Interest : Jurnal Ilmu Kesehatan*, 279–299. https://doi.org/10.37341/interest.v0i0.415

INTRODUCTION

The globally spreading COVID-19, which first appeared in Wuhan, China, in December 2019, affects health and the form of health services. Patients with health conditions that require regular therapy or medication may be vulnerable to the COVID-19 pandemic (Bitar and Alismail, 2021). The treatment can be overcome by social distancing. Social distancing is crucial to slowing the spread of COVID-19; visiting healthcare facilities in person is turning into remote medical consultations (Adnan, Miranti Dewi, and Pramaningtyas, 2020).

The use of information and communication technology is needed. Therefore, electronic health technology (e-health), telehealth, and/or telemedicine are ideal tools to be adopted in this pandemic era (Bitar and Alismail, 2021). In 1970, telemedicine was described as "healing from afar". This term includes the application of information and communication technology to improve patients' health outcomes by increasing medical care access and interventions (Ryu 2012).

The combination of new advances in technology, response, and adaptation to changing needs and societal contexts makes telemedicine an open and evolving science (Ryu, 2012). The use of telemedicine has risen during the COVID-19 period and has resulted in increased research to study the effectiveness of telemedicine on health-related quality of life (Wahezi et al., 2021). It is reasonable because the change from direct medical consultation to consultation via telemedicine is new, especially for patients who require regular visits to healthcare facilities.

These patients generally suffer from degenerative diseases, chronic diseases, or terminal diseases that require continuous examination and therapy. In addition, patients are usually elderly, so they need socialization and training before using telemedicine (Salisbury et al., 2015). The effect of telemedicine on life quality, especially Health-Related Quality of Life (HRQoL), should be re-examined.

Research conducted by Blitar and Alismail, (2021) stated that the availability of evidence regarding the effectiveness of telemedicine is still limited and that further research into increasing the credibility of telemedicine to maintain HRQoL during the pandemic in patients with chronic diseases is needed (Bitar & Alismail, 2021). From the explanation above, the evidence of the effectiveness of telemedicine in maintaining and improving the quality of life for patients, who are mostly elderly patients, needs to be reviewed. Particularly in light of the increased use of telemedicine during the COVID-19 pandemic.

This also underlies that this systematic review must be carried out immediately. The aims of the systematic review are to describe the effectiveness of telemedicine during COVID-19 in maintaining the HRQoL of chronic disease patients who require regular visits to health providers.

MATERIALS AND METHOD

A systematic review described the effectiveness of telemedicine to maintain HRQoL during the COVID-19 pandemic. The Pubmed, ScienceDirect, and Sage databases ran article searches with the keywords "Covid-19, telemedicine, and Health-Related Quality of Life". Selected articles published during the COVID-19 pandemic.

The inclusion criteria were clinical trial articles published during the COVID-19 pandemic with HRQoL outcomes. Meanwhile, the exclusion criteria were articles in review form, laboratory research, case reports or experimental research on animals, qualitative research, articles not published in English, and research that did not have

complete information, such as sample size. Selected articles were chosen from the title and abstract and screened based on the inclusion and exclusion criteria that have been set. The author assessed the articles' quality according to the research method used.

Assessment of research quality using instruments from the NHLBI. NHLBI has published several tools that can be used to assess clinical testing articles in several methods, namely RCT, observational, cohort, cross-sectional, case-control, pre-post studies, and case series methods. The tool consists of 12 to 14 questions that must be answered "yes" or "no" or "not available (NA)" or "not reported (NR)".

The questions contained the following information: clarity of research objectives, sample selection and criteria, number of samples, clarity of intervention and intervention time, type of outcome, the timing of outcome measurement, and data analysis. If a question is answered "no", then the reviewer must predict whether it is capable of producing a significant bias in the research design and implementation of the study's results. Reviewers assessed each study using the study rating tools' range of items to determine if it was of "good," "fair," or "poor" quality.

The reviewers utilized the ratings on the various categories to determine the risk of bias in the study due to errors in study design or implementation. In general, a "good" study has the lowest risk of bias, and its findings are regarded as reliable. A "fair" study is subject to some bias, but not enough to invalidate its findings. Because the "fair quality" category is likely to be broad, the research assigned to it will have a wide range of strengths and weaknesses.

A "poor" score suggests a high danger of prejudice. Poorly scored studies were not included in the body of evidence for each CQ. The only exception was if no other evidence was provided, in which case low-quality studies could be accepted. This exception was not used in this project since no scenarios were discovered in which only low-quality studies were available for a body of evidence for a specific CQ.

Data extraction used PICO (Patient, Intervention, Comparator, and Outcome). The patient is a chronic disease patient that needs regular visits to health providers. Telemedicine is used for intervention. A comparator can be either a no-contender or a routine visit. The outcome is health-related quality of life. Data were tabulated to determine the type of telemedicine and the effectiveness of telemedicine on HRQoL. Data synthesis was accomplished through a narrative review of the extracted data.

RESULTS

The systematic review obtained eleven (11) articles that met the selection criteria, as shown in Figure 1. Three (3) pre-post test studies; one (1) prospective observational study; three (3) cross-sectional studies; three (3) cohort studies; and one (1) randomized control trial (RCT). The quality of the articles studied was good because they met the completeness requirements for the information or data for each research method needed in the instrument, with a value of more than 70%. A detailed explanation is in Table 1.

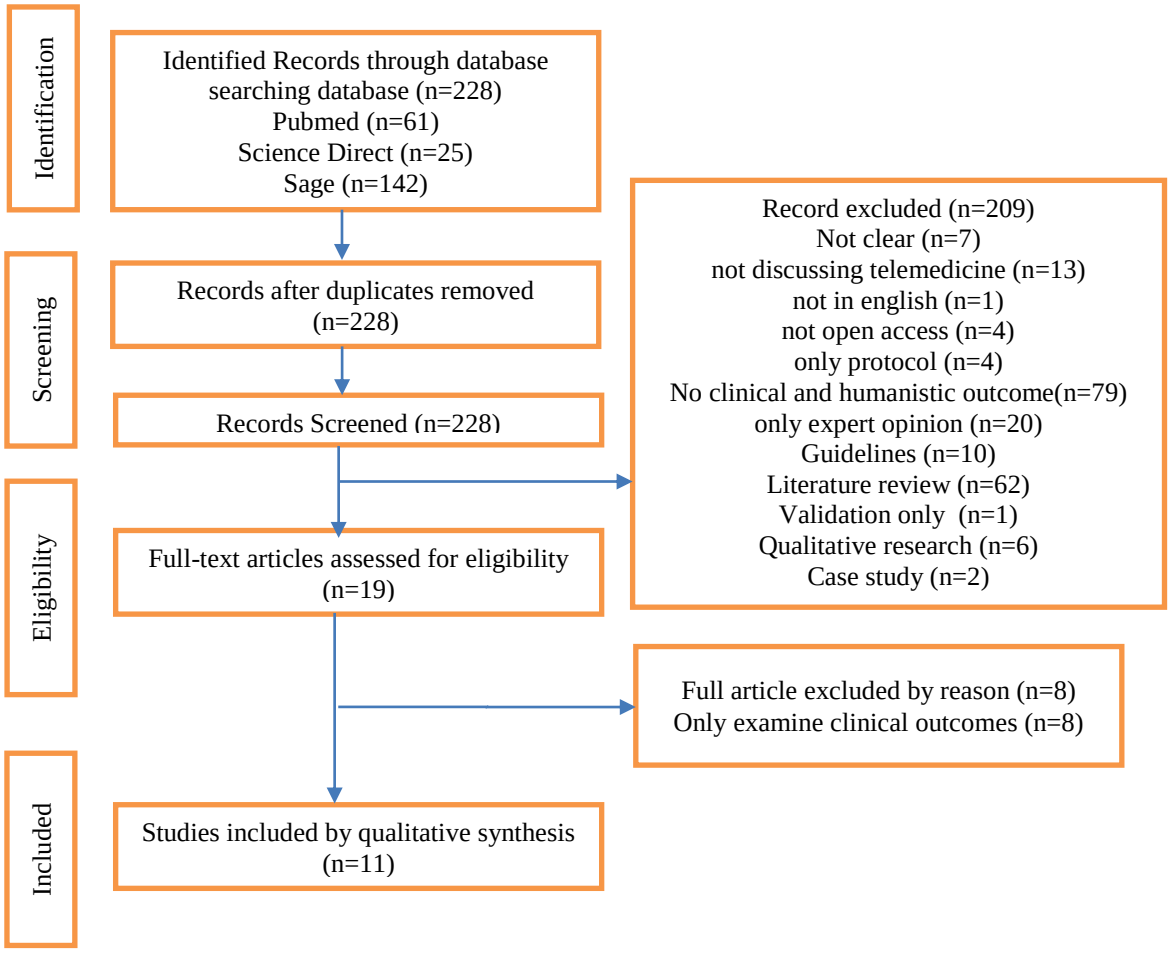

Figure 1. Selection process using PRISMA flow chart

Table 1. Characteristics of articles included in the systematic review

Article (Author's Name)	Research Methods	Eligibility of Good Articles Based on Research Methods (%)	
Ajčević et al. (2021)	Pre-post test	83,33	e
De Marchi et al., (2021)	Pre-post test	83,33	
Frey et al. (2020)	Prospective observational	85,72	
Hanke et al. (2020)	Pre-post study	75,00	
Van de Poll-Franse et al. (2021)	Cross-sectional	85,72	
Martino et al. (2021)	Cohort study	85,72	
Narayanan et al. (2021)	Cohort study	85,72	
Nguyen et al. (2021)	Cross-sectional	85,72	
Philip et al. (2020)	RCT		
Pulvirenti et al. (2020)	Cross-sectional	85,72	
Wu et al. (2021)	Cohort study	85,72	there are two (2) 'no' answers out of fourteen (14) questions. Answer 'No' to the question "did the study examine

Article (Author's Name)	Research Methods	Eligibility of Good Articles Based on Research Methods (%)	
			different levels of the exposure as related to the outcome?" and the question: "Were the outcome assessors blinded to the exposure status of participants?". This study does not categorize the level of exposure. All study subjects were given the same treatment in the form of telehealth-delivered prehabilitation prior to surgery and/or during non-surgical cancer treatment, which includes personalized training exercises, dietary advice, medical optimization therapies, and psychological support. It is also not possible to blind assessors about the exposure status of study subjects. This research is good because the number of samples is sufficient and the flow of screening research subjects, explains the treatment in detail so that the outcomes can be measured to determine the effectiveness of the telehealth application provided.

Data extraction was carried out based on PICO, which describes patients, interventions, comparators, and outcomes as shown in Table 2. Table 2 showed that most studies were carried out in Italy, namely four (4) studies, the United States and the United Kingdom each with two (2) studies, then Germany, the Netherlands, and Vietnam, respectively, with one (1) study. The patients' mean age at participation was more than 18 years. The number varied from a minimum of 8 patients to a maximum of 4094 patients.

The limitation of the study by Ajčević et al., (2021) and Philip et al., (2020) is the small number of samples. This has been explained in each article Ajčević et al., (2021) explained the limitation of the sample because this study was in the context of testing the telemedicine application, so a sample with strict inclusion criteria was needed to assess the benefits of the application (Ajčević et al., 2021). Philips et al., (2020) honestly explained that this study was only able to explain the effectiveness of telemedicine on research subjects, but the outcome results would not necessarily be applied if the research was conducted on larger research subjects, so further research is needed for the given telemedicine program (Philip et al. 2020).

It is the clarity of the number of samples that causes the two studies to be included in this systematic review. Most research was conducted on cancer patients, followed by degenerative diseases such as stroke, ALS, COPD, and kidney transplantation. One study has as its object patients with primary antibody deficiency, and one study has patient characteristics in the form of outpatients without emergency conditions.

Based on the types of interventions and comparators described in Table 2, research on the use of telemedicine is done primarily without a comparator. The actual comparator is an offline visit, but this is difficult because the research was done during COVID-19. There are only two studies with comparators, by Narayanan et al., (2021) and Philip et al., (2020). Some of the telemedicine being piloted is not just pure telemedicine but rather telehealth. Telemedicine requires patient interaction with doctors and other health workers such as psychologists, physiotherapists, psychiatrists, nutritionists, and others.

Table 2 also showed the result of article extraction based on the HRQoL outcome. Several studies tested telehealth rather than telemedicine because it required the activities or competencies of other health workers besides doctors to measure these outcomes. The most estimated humanistic outcomes were quality of life, anxiety, and depression.

The HRQoL was primarily assessed using the EQ-5D questionnaire or the SF-36 as the generic instrument. Some studies use specific measurement instruments for certain diseases, for example, the measurement of cancer patients is the Cancer Worry Scale (CWS) by Frey et al. (2020), the EORTC QLQ-C30 questionnaire by Franse et al., (2021) or a special CVID questionnaire for the quality of COVID-19 patients by Philip et al. (2020). The study also measured the incidence of depression and anxiety through the use of a standard instrument for measuring levels of anxiety and depression.

Table 2. Extraction of articles based on PICO (Patients, Intervention, Comparator, Outcome)

Article (Author's Name)	Country	Patients			Intervention	Comparator	Humanistics Outcome (HRQoL and Instruments)
		Number	Age (Year)	Characteristic			
Ajčević et al., (2021)	Italy	8 (6F/2M)	73,2 ± 9,6	Early post-acute TIA (transient ischemic attack) / Minor stroke	e-Health for telemonitoring patients at home. A telemonitoring system and protocol for the risk of stroke recurrence. The system involves portable devices to sense blood pressure, Heart rate (HR), SpO2, temperature, panic buttons, gateways, and unique ICT platforms. Protocols consist of telemonitoring, treatment, and emergency intervention for 14 days based on signal changes in vital signs.	No Comparator	Anxiety, depression status, HRQOL (EQ-5D-5L)
De Marchi et al., (2021)	Italy	19 (12F/7M)	> 18	Patients with Amyotrophic lateral sclerosis (ALS)	Telemedicine was used multidisciplinary team including a neurologist (for clinical evaluation, reoccurring events, and drug prescription); nutritionist (for diet and weight monitoring); psychologist (to assess and support patients's psychology); and physiotherapists (physiotherapy treatments and performed using the online platform "IoMT Connected	No Comparator	psychological assessment and support (Hospital Anxiety and Depression Scale collection-HADS (Zigmond AS, 1983)-and the ALS Assessment Questionnaire ALSAQ-4018

Article (Author's Name)	Country	Patients			Intervention	Comparator	Humanistics Outcome (HRQoL and Instruments)
		Number	Age (Year)	Characteristic			
					Care Platform (Ticuro Reply)."		
Frey et al., (2020)	United States	511 (511 F)	Mean (range) : 58 (20-85)	Women with ovarian cancer	Telemedicine self-identifying ovarian cancer, telemedicine for gynecological oncology treatment	No Comparator	Quality of life (the Cancer Worry Scale (CWS) and Hospital Anxiety (HADS-A) and Depression Scale (HADS-D)
Hanke et al., (2020)	Germany	248 (89 F/159 M)	52.3 ± 13.7 (F) and 56.3 ± 13.0 (M)	Patients with the kidney transplant	Telemedicine-Based Aftercare Program	No Comparator	HRQoL (Short form 12 Health Survey (SF-12))
van de Poll-Franse et al., (2021)	Netherland	4094 vs 977 (Cancer versus norm participants)	63,0±11,1 (The data above is for the cancer group, for norm participants, there is no age data)	Patients with cancer versus norm pasticipants	Virtual healthcare concultation via video (VC) or (TC) as an alternative to face-to-face visits.	No Comparator	1. HRQoL (with EORTC QLQ-C30), 2. Anxiety and depression symptoms with the Hospital Anxiety and Depression Scale
Martino et al., (2021)	Italy	121	55 ± 17	Patients with adrenal insufficiency	Three tele-questionnaires: "CORTI-COVID" to assess clinical history and global health concerns related to COVID-19, specific personal health of AI, occupational, economic, and social impact; Short-Form-36 Health Survey (SF-36), AddiQoL-30;	No Comparator	QoL with ADDIQoL is an instrument of fatigue, symptoms, emotions, etc., and the SF-36 for a physical function, limitation of physical health, limitation of emotional problems, energy/fatigue, emotional well-being, social functioning, physical illness, and health

Article (Author's Name)	Country	Patients			Intervention	Comparator	Humanistics Outcome (HRQoL and Instruments)
		Number	Age (Year)	Characteristic			
							perception.
Narayanan et al., (2021)	United States	509 (F:390) vs 842 (F:615) (Intervention versus control)	56 ± 13 vs. 56 ± 13	Patients with cancer	Integrated EHR-telemedicine platform used for IO doctor consultation (integrative oncology) versus face-to-face doctor consultation	Face-to-face doctor consultation	QoL with the PROMIS-10
Nguyen et al., (2021)	Vietnam	5348 (F: 2694)	42,8 ± 16,7	Outpatients without emergency conditions	Health literacy and digital healthy diet literacy, e-health literacy	No Comparator	FCoV-195 measured the COVID-19 fear score, HRQoL (self-administered SF-36 to evaluate the quality of life with eight health aspects such as vitality, physical function, body aches, general health, the function of the physical role, emotional role, and mental health. Assessment methods are provided in the user guide. Overall scores were between 0 and 100, the higher scores indicating the better HRQoL.
Philip et al., (2020)	United Kingdom	9 (F:3) vs 9 (F:6) (intervention versus control)	72,1 ± 9,7 vs 69,9 ± 9,4	Chronic obstructive pulmonary disease (COPD)	Moving singing for lung health (SLH) online versus usual care	Face-to-face doctor consultation	Anxiety or depression with the GHQ-12 instrument and HRQoL with the CVID questionnaire)
Pulvirenti et al.,	Italy	158 (F:79)	47,3 ± 13,8	Primary antibody	home settled therapy by activating a remote assistance	No Comparator	Initial and final measurements of QoL with the SF-36

Article (Author's Name)	Country	Patients			Intervention	Comparator	Humanistics Outcome (HRQoL and Instruments)
		Number	Age (Year)	Characteristic			
(2020)				deficiency	service. The remote service consists of active telephone contacts by the responsible physician to his or her patient every 4 days.		questionnaire
Wu et al., (2021)	United Kingdom	182 (Only 100 patients completed the program)	> 18	Cancer	Home-based programs delivered via telehealth that consists of critical interventions such as personalized exercise, nutritional advice, medical optimization therapy, and psychological support.	No Comparator	QoL with EQ-5D-3L and Functional Assessment of Chronic Illness Therapy (FACIT)-Fatigue Scale.

Description:
F: Female, M: Male, HRQoL: Health-Related Quality of Life, QoL: Quality of Life

Table 3. Effectiveness of Telemedicine on HRQoL in Patients

Article (Author's name)	The Effectiveness on HRQoL
Ajčević et al., (2021)	E-health for early post-acute TIA/ minor stroke patients can significantly improve quality of life for 14 days using telemonitoring to decrease anxiety and depression.
De Marchi et al., (2021)	Telemedicine for ALS patients is effective in reducing anxiety and depression scores. Quality of life measurement results with ALSAQ-40 are relatively stable
Frey et al., (2020)	Telemedicine in ovarian cancer patients can significantly reduce anxiety and depression, but the decrease in patients' anxiety is not significant.
Hanke et al., (2020)	The telemedicine-based programs in patients with kidney transplants can stabilize quality of life during the Covid-19 pandemic.
van de Poll-Franse et al., (2021)	Virtual Health Care of cancer patients showed the comparable quality of life, anxiety, and depression among cancer patients versus norms participants, but norms participants reported more loneliness than

Article (Author's name)	The Effectiveness on HRQoL
	cancer patients (12% vs. 7%).
Martino et al., (2021)	The domain most affected by the "Corti-covid" questionnaire was Energy/Fatigue. The mean Emotional was similar between groups, depending primarily on "personal health" in the primary AI (ρ=0.888, $p<0.0001$) and "economy" in the secondary AI (ρ=0.854, $p<0.0001$). CORTI-COVID is inversely correlated with quality of life, with AddiQoL-30 and SF-36 strongly correlated. Comorbidities worsen the patient's quality of life. Even under unusual stress, educated AI patients maintained a good quality of life" (ρ=0.786, $p<0.0001$); "Energy/fatigue" was the domain that contributed the most to "General health perception" (ρ=0.700, $p<0.0001$). If educational efforts are made to prevent acute events, AI patients do not appear to be particularly susceptible to COVID-19. The new "CORTI COVID" questionnaire reliably assesses the emotional burden associated with the AI in pandemic.
Narayanan et al., (2021)	Consultation using IO telehealth is feasible and meets patient needs. Compared with patients seen in person during 2019, patients undergoing telehealth IO consultations in 2020 reported QoL, PROMIS-10 did not result in significant differences in mental health or global health.
Nguyen et al., (2021)	Health literacy and digital healthy dietary literacy can protect patients from the negative impact of fear during the pandemic.
Philip et al., (2020)	Pilot data suggest online group singing may benefit reducing depression and increasing balance confidence. There was an increase in HRQoL in online SLH, although insignificant.
Pulvirenti et al., (2020)	The decreasing of HRQoL in patients at risk of anxiety/depression at the study time. HRQOL was equal in patients that had to switch to home-based immunoglobulin treatment to those who continued hospital-based care. The risk of anxiety/depression was associated with the pandemic. It caused by severe acute respiratory syndrome coronavirus, patient fragility, it was not associated with clinical conditions related to generalized variable immune deficiency. Anxiety about running out of medication is a significant new problem. The pandemic impacted HRQOL and anxiety/depression risk of patients. Remote assistance programs were a valuable possibility to limit personal contact without affecting HRQOL.

Article (Author's name)	The Effectiveness on HRQoL
Wu et al., (2021)	After completing rehabilitation, the EQ-5D-3L investigation showed an increase in the patients with "No problem" category for all dimensions. Patients scored "Extreme problem" in the "Anxiety/Depression" dimension after completing pre-rehabilitation. The statistically significant increase in the EQ VAS (median (in the quartile range) in before versus after study: (75 (65-86) vs. 80 (70-90)); p = 0.001) and the FACIT-Fatigue Scale in before versus after study (44 (38–48) vs. 47 (43–50); p = 0.000). No statistically significant change in EQ-5D scores (before: 0.796 (0.691-0.857) vs. after: 0.796 (0.725-1,000); p = 0.092).

The results of using telemedicine have shown its effectiveness on HRQoL, as described in Table 3. In general, table 3 indicates that quality of life can be maintained by telemedicine during the COVID-19 pandemic. There is only one article reporting an improvement in quality of life due to telemedicine use. The article by Ajčević et al., (2021). Ajčević et al., (2021) reported that e-Health for telemonitoring TIA patients at home can improve the patient's quality of life.

All articles examining the use of telemedicine in cancer patients report that telemedicine can maintain patients' quality of life (Frey et al., 2020) (Wu et al., 2021) (Narayanan et al., 2021) (van de Poll-Franse et al., 2021). Research on cancer patients comparing the telemedicine group with the non-telemedicine group stated that there was no significant difference in the quality of life between the telemedicine group and the non-telemedicine group (Narayanan et al., 2021). There is no significant difference in the quality of life between cancer patients and norm participants who both use telemedicine (van de Poll-Franse et al., 2021).

De Marchi et al., (2021) reported that telemedicine can maintain the quality of life of ALS patients. Philip et al., (2020) found in their limited research that telemedicine can maintain the quality of life of COPD patients and that there was no significant difference in the quality of life between the telemedicine group and the group without telemedicine. The effectiveness of telemedicine to maintain quality of life has also been demonstrated in studies in patients with kidney transplantation Hanke et al., (2021), patients with adrenal insufficiency Martino, et al., (2021), patients with primary antibody deficiency (PAD) Pulvirenti et al., (2020) and in outpatients who do not experience an emergency (Nguyen et al., 2021).

Pulvirenti et al., (2020) even compared the quality of life of patients using and without telemedicine, and the result was that there was no significant difference in the quality of life in the two groups.

DISCUSSION

Social distancing during a pandemic allows for significant changes to health services. Telemedicine is becoming more popular for preventing disease progression, particularly for conditions that necessitate therapy and monthly monitoring. That is the foundation of this study, a systematic review of the efficacy of telemedicine in the COVID-19 pandemic (Wahezi et al., 2021).

From the eleven selected articles, it is known that the type of telemedicine used also requires collaboration with other health workers. Doctors are not the only health workers who treat patients' conditions. This type is more accurately called telehealth. Telemedicine and telehealth are synonyms and are used simultaneously to support each other.

The difference is that doctors only carried out the providers' duties as service providers. At the same time, telehealth can be provided by other health professionals, including pharmacists, nurses, and others (Ryu, 2012). In this systematic review, telemedicine and telehealth are ultimately considered the same. The stability of the quality of life because of telemedicine is shown in the results of seven studies (De Marchi et al., 2021) (Hanke et al., 2020) (Nguyen et al., 2021) (Wu et al., 2021) (Pulvirenti et al., 2020) (Philip et al., 2020) (Martino et al., 2021).

The improved HRQoL due to telemedicine is shown in the study of Ajčević et al., (2021). That the use of telemedicine in TIA patients can improve the patient's quality of life (Ajčević et al., 2021). Stroke is a degenerative disease that is a burden on the world.

The Global Burden of Disease (GBD), in 2016 reported that the risk of stroke at an age greater than or equal to 25 years is 24.9%.

The risk of stroke was almost the same between women and men, with an 18.3% risk of ischemic stroke and an 8.2% risk of hemorrhagic stroke. This increases the health burden in stroke therapy (Gorelick 2019). The risk of ischemic stroke may increase by 30% during the COVID-19 pandemic through mechanisms such as systemic hypercoagulability, endothelial injury, and infection-associated atrial fibrillation (Katsanos et al., 2021).

TIA and minor stroke management should remain important in health care in the sub-acute phase during the COVID-19 pandemic because TIA carries a high risk of early stroke and is associated with poorer long-term survival. Telemedicine and telemonitoring (e-Health) may be a solution for health workers to provide better therapeutic management for TIA and mild stroke patients in the sub-acute phase while at home and can also be applied in the routine care of patients in the health care system during and after the pandemic (Furlanis et al. 2020). The improvement in the quality of life of patients with TIA may be due to the reduction in anxiety and depression status as measured by the EQ-5D-5L. Patients feel cared for and closely monitored, even at a distance, after an acute life-threatening event (Ajčević et al., 2021).

It is consistent with a study conducted by D'Ana et al., (2021) which found that telemedicine consultations in TIA patients were not associated with a 3-month increase in the rate of TIA, recurrent stroke, or cardiovascular hospital stay during a pandemic. Authentic patient involvement and different communication strategies among doctors affect the effectiveness of telemedicine. In addition, staff workflows and functions need to be adapted to the model of using telemedicine in health services to ensure that telemedicine can improve patient care at a lower cost.

The inconvenience for doctors in providing virtual consultations for all patients and the lack of physical examination need to be taken into account when developing services. More robust research to test the long-term effects of telemedicine is still needed (D'Ana et al., 2021). De Marchi et al., (2021) stated that telemedicine involving multidisciplinary therapy in ALS patients was able to maintain the patient's quality of life. Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disorder characterized by a rapid and progressive loss of motor function of neurons in the brain and spinal cord.

Treatment from multidisciplinary health workers is needed to improve patient survival and quality of life. Coordinated multidisciplinary care from neurologists, physical therapists, speech therapists, occupational therapists, respiratory therapists, social workers, dietitians, and nursing care managers should be considered for managing patients with ALS (Zarei et al., 2015). Management of ALS therapy requires quarterly visits.

Meanwhile, the healthcare system has changed during the COVID-19 pandemic. Telemedicine, involving all multidisciplinary roles in handling ALS, is needed by patients during the COVID-19 pandemic (De Marchi et al., 2021). In their discussion, De Marchi et al., (2021) stated that the quality of life of patients can survive because telemedicine affects the psychological aspects of patients. They are followed every two weeks by a specialized neurologist via telemedicine. There was a significant reduction in depression.

The patient's emotions can be controlled. This is in accordance with the research by Bombaci et al., (2021) which stated that receiving a diagnosis of a deadly disease

such as ALS can greatly affect the emotional, physical, and mental aspects of the patient's life, and in these patients, psychological support is also very necessary. It’s an important aspect of management (Bombaci et al., 2021).

In addition, the quality of life of ALS patients can be maintained by telemedicine due to the stabilization of ALSAQ-40 values, which are able to characterize the patient's quality of life in terms of muscle strength, motor disability, and respiratory failure. This is in accordance with the study of Alencar et al., (2022) in ALS patients, who stated that pain conditions, weak muscle strength, motor disabilities, and respiratory failure were associated with poor quality of life (Alencar et al., 2022). Govindarajan et al., (2020) stated that remote assessment of ALS patients needs to be done with telemedicine that is able to assess aspects of physical examination, measurement of respiratory function, and functional assessment scales.

Many tools are available to conduct ALS clinical research through mechanisms other than the traditional in-person visit. Remote recruiting, consenting, and screening methods of patients using telemedicine methods are urgently needed. There are technologies for the assessment of respiratory function in the home environment that can be included in telemedicine applications. Digital phenotyping and technology-enabled measures of motor function are being actively explored and hold promise as remotely collected, quantifiable, and objective outcome measures.

It is hoped that continued exploration and validation of outcome measures, coupled with continued engagement with regulators, will facilitate the core goals of maximizing opportunities for patient engagement, minimizing patient and caregiver burden, and providing accurate data for outcome analysis (Govindarajan et al., 2020). The systematic review resulted in four (4) studies on telemedicine in cancer. Frey et al., (2021) demonstrated the effectiveness of telemedicine in maintaining the quality of life of ovarian cancer patients.

Van de Poll-Franse et al., (2021) compared the effectiveness of telemedicine in cancer patients and norm participants, and the result was that the difference in quality of life between the two groups was not significant. The normal participants reported feeling more lonely than the cancer patients. Cancer patients, on the other hand, are more concerned about being infected with SARS-CoV-2 (van de Poll-Franse et al., 2021). Narayanan et al., (2021) also stated that there was no significant difference in the quality of life between cancer patients who used telemedicine with patients who did not use telemedicine (Narayanan et al., 2021).

Wu et al., (2021) stated that the EQ-5D-3L investigation showed an increase in the number of patients in the "No problem" category for all dimensions after taking the telemedicine program. These results are in accordance with the results of a systematic review conducted by Pang et al., (2020) which stated that lung cancer patients who used telemedicine had a significantly higher quality of life than the usual care group. The telemedicine group also had lower anxiety and depression scores than the usual care group, although there were no significant differences in the fatigue and pain domains between the two groups.

Further development of telemedicine is urgently needed because this method is effective in improving the quality of life of pulmonary patients (Pang et al., 2020). Martino et al., (2021) showed the impressive effectiveness of telemedicine on quality of life. Martino et al., (2021) stated that educated patients could maintain their quality of life better than others. The results align with Sayuti et al.'s (2019) research, which said that higher education and income levels are associated with more favorable physical,

social, and environmental quality dimensions. It is because patients with higher education and higher socioeconomic status are more able to access health information and services than other patients (Sayuti et al., 2019).

Some of the most influential domains for telemedicine use were also reported in the study by Martino et al., (2021). The domain is energy or fatigue, which contributes significantly to health due to comorbidities that often occur in adrenal insufficiency patients, worsening HR-QoL. The development of telemedicine in the form of education to prevent acute events, deal with stress, and assess emotional burdens in patients with adrenal insufficiency is urgently needed (Martino et al., 2021). Patients should immediately contact the Endocrine Center via telemedicine consultation to be aware of cortisol deficiency, the risk of being infected with COVID-19, and self-management of adrenal crisis (Sabbadin et al., 2021).

Telemedicine systems do not have to use sophisticated digital technology. The exchange of data and information in digital format that is sent to doctors directly from patients or caregivers using software and/or digital medical devices must still be accompanied by consultations via video calls. It should be noted that telemedicine is an adjunct strategy in disease management rather than a replacement solution for managing adrenal insufficiency.

Health professionals must still be equipped with communication skills in order to explore patient conditions such as the risk of infection, the risk of COVID-19, disease management, how to diagnose adrenal insufficiency during COVID-19, the possibility of COVID-19 triggering autoimmune diseases, and the risk of developing other autoimmune diseases after COVID-19 infection or vaccination in patients with adrenal insufficiency (Sabbadin et al., 2021) (Group 2020). Pulvirenti et al., (2020) revealed that the HR-QoL was worse in primary antibody deficiency patients who experience anxiety and depression. Primary immunodeficiency disease (PID) is a condition in which there is a defect in the immune system caused by mutations in the genetic code that encodes the components that make up the body's immune system.

This disorder is classified as rare but reduces the quality of life and can even be life-threatening for the sufferer (Mahendra, 2021). The findings are consistent with Sayuti et al., (2019) discovery that spiritual health influences anxiety and depression. The combination of medical therapy and spiritual intervention should be a priority in the treatment of these patients (Sayuti et al., 2019).

De Marchi et al., (2021), Frey et al., (2020), and Philip et al., (2020) conducted studies showing a decrease in depression and anxiety scores due to the use of telemedicine. In contrast, Pulvirenti et al., (2020) showed the results of an increase in terms of depression and anxiety. The patient's compulsion caused the decline because they switched to telemedicine.

Wu et al., (2021) also showed that a lot of patients scored "extreme problems" in the dimension of "anxiety and depression" after completing pre-rehabilitation. Those are classic problems for cancer survivors. The results of these studies may be interrelated, primarily if the research is carried out during a pandemic. The risk of anxiety and depression was linked to the severe acute respiratory syndrome coronavirus 2 pandemic and patient fragility. It’s not associated with clinical conditions such as drug depletion anxiety.

Research with comparator groups stated that cancer patients had a quality of life, anxiety, and depression that were comparable to non-cancer patients. Loneliness is common in non-cancer patients. The patients were more worried about being infected

with the pandemic virus than non-cancer patients (van de Poll-Franse et al., 2021). IO consultation using telehealth was feasible and met patient needs. Patients undergoing telehealth IO consultations reported a lower symptom burden.

Patients also have concerns about lifestyle, herbs, and supplements. Face-to-face or offline consultations showed a decrease in physical health that was statistically significant than the telehealth cohort (P = 0.038) (Narayanan et al., 2021). Quantitative data on study subjects reported possible improvements in depression and balancing beliefs. The study identified critical considerations for the SLH adaptation from face-to-face to online delivery. Pilot data suggests online group singing for people with COPD can reduce depression and increase balance confidence.

Although it was insignificant, there was an increase in HRQoL in online SLH. SLH is a singing group program specifically developed for people with COPD. The SLH trial in small groups was able to improve biopsychosocial quality, but during the COVID-19 pandemic, which required social distancing arrangements, this program was suspended to be implemented face to face so it had to be run online. Even though there were things that patients cannot feel if the program was implemented online, such as loving conversations and interactions with each other, digital barriers, and digital facilitators, online SLH was able to increase HRQoL for COPD patients (Philip et al., 2020).

Nguyen et al., (2021) tested several digital products that facilitate health literacy, therapy, and medication, as well as healthy diets for outpatients, in eleven hospitals in Vietnam. The product was used in conjunction with the distribution of the FCOV-19-S and HRQoL questionnaires. FCov-10-S is a questionnaire that measures a patient's fear of COVID-19. Research showed that patients with higher FCoV-19S scores had lower HRQoL scores.

The use of electronic health literacy and a digital health diet were found to be positively related to patient quality of life. Health literacy and digital healthy diet literacy can help protect patients' health-related quality of life from the negative impact of fear of COVID-19 during the pandemic (Nguyen et al., 2021). These results are due to regular interactions between health workers and patients through telemedicine to reduce anxiety or depression and maintain HRQoL. It follows the statement of Prawiroharjo et al., (2019), namely that telemedicine services can reduce the opportunities for interaction between doctors and patients.

In Indonesia, telemedicine has developed into online consultation, telesurgery, and teleradiology. Still, these services should not be used to replace face-to-face interactions between doctors and patients. Face-to-face contact between doctors and patients is still needed, so telemedicine must be developed and aligned with the regulations on telemedicine that have been set in Indonesia.

There are still many forms of telemedicine that can be created in Indonesia. Therefore, it is necessary to research the need for telemedicine, especially the development of government-based telemedicine (Prawiroharjo et al., 2019).

CONCLUSION

The conclusion is that the systematic review was able to describe the effectiveness of telemedicine in maintaining HRQoL in stroke patients, ALS, adrenal insufficiency, cancer, COPD, primary antibody deficiency, and outpatients during the COVID-19 pandemic. The recommendation obtained from the results of this study is that

telemedicine should continue to be developed with the features needed by patients even though COVID-19 has passed.

ACKNOWLEDGEMENT

This research was conducted based on the Decree of the Director of Poltekkes Kemenkes Surakarta, Number HK.01.07/1.3/9671/2021. The authors would like to thank various parties who contributed to this research.

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