Outcome of a Telerehabilitation Program for a Home-Bound Geriatric Patient with Post Covid-19 Syndrome in Indonesia: A Case Report and Literature Review

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ABSTRACT

Objectives: This study aimed to share a local experience in implementing a telerehabilitation program for a geriatric patient with post-COVID-19 syndrome following the third-wave pandemic and to describe the clinical outcomes.

Study design: A case report and literature review.

Setting: Hermina Kemayoran General Hospital, Jakarta, Indonesia.

Subjects: An unvaccinated 80-year-old male patient diagnosed with post-COVID-19 syndrome from the Delta strain presented with desaturation.

Methods: The patient underwent an individualized telerehabilitation program for 4 weeks via video call.

Results: His pulmonary symptoms, functional capacity, functional independence, and quality of life improved following the telerehabilitation program. The investigators found the challenges to initiating telerehabilitation in Indonesia include inequality of access to the internet, portable medical and health-monitoring home devices, reliable telecommunication devices, home exercise equipment, and competent caregivers. Fortunately, the patient and his family presented in this case report were able to overcome these challenges.

Conclusions: Telerehabilitation is an option for patients who have difficulty visiting a hospital to access rehabilitation services. It is necessary to improve various aspects of health among patients infected with COVID-19.

Keywords: functional status, geriatrics, telerehabilitation, COVID-19, quality of life

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Introduction

Telerehabilitation is the provision of rehabilitation services through any form of information and communication technology, including Internet-based platforms, allowing patients to interact with rehabilitation providers remotely for evaluation and intervention.[1] It consists of teleconsultation and teletherapy sessions. Telerehabilitation (TR) programs have been proven effective in many conditions including for patients after COVID-19, geriatric patients, and many more.[2] Since the COVID-19 pandemic in 2020, telemedicine services have begun to develop in Indonesia. One sort of telemedicine is telerehabilitation which focuses on rehabilitation services.[3] However, telerehabilitation has not been commonly employed or studied in Indonesia despite its usefulness abroad.

Post-COVID-19 syndrome is characterized by persistent symptoms and/or delayed or long-term complications of COVID-19 disease beyond 4 weeks from the onset of symptoms.[4] The study conducted by Huang et al. that followed 1,733 patients for 6 months showed that the majority of post-COVID-19 symptoms include fatigue or muscular weakness (63%), insomnia (26%), and anxiety or depression (23%) among others. Most of the patients reported the presence of at least one symptom (76%).[4,5] These symptoms can cause disability and reduce the quality of life among COVID-19 survivors. Another study by Carfi and colleagues found that among the persistent symptoms 2 months after disease onset, persistent fatigue was seen in more than 50% of patients, dyspnea in 43%, and joint pain in 27%. The rates of these symptoms were higher among older people. Older people who were relatively healthy before the infection experienced

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more severe functional decline and deterioration in activities of daily living, along with other phenotypic characteristics of frailty following COVID-19.[6,7]

In-person rehabilitation programs can help prevent or minimize these consequences. However, many patients have difficulty in going physically to the hospital because of various reasons, such as older adults/geriatric patients, O2-dependent, absence of facilities.[3] Geriatric patients are particularly vulnerable to COVID-19 contagion when they come in for center-based rehabilitation frequently.[3] Telerehabilitation can be a feasible solution to address these constraints. A study by Vieira et al. showed that telerehabilitation may improve functional capacity, dyspnea, and quality of life without a substantial increase in adverse events.[8] This case report shares a local experience in Jakarta, Indonesia regarding the challenges and outcomes in employing telerehabilitation for a geriatric COVID-19 patient to hopefully contribute to the very meager evidence of telerehabilitation in the country and provide insight on its feasibility and safety amid limited resources.[1,2]

Case presentation, intervention, and outcomes

An 80-year-old male patient was referred for rehabilitation with the chief complaint of shortness of breath even at rest. He has been dependent on high-flow oxygen support, and all functional activities were done lying in bed because his oxygen saturation dropped by > 5% every time he tried to sit-dangle on the bed. Cough was also triggered every time he tried to move his body. The patient lives more than 30 kilometers away from the nearest rehabilitation facility in their area. Since he could not get out of bed for in-person consultation and renting an ambulance at that time was difficult because of the high demand for emergency services during the pandemic, his internist referred him to the online rehabilitation facility in our hospital. At that time, our hospital was among the very few hospitals in Indonesia providing telerehabilitation services. The telerehabilitation consultation through video call was done with a physiatrist.

He had a COVID-19 infection approximately two months prior to the teleconsultation and was hospitalized for 33 days. He was never intubated nor admitted to the intensive care unit. He was given a high-flow nasal cannula for 14 days in an isolation room and oxygen supplementation at 5 Liters per minute for another 14 days in the regular room. He was discharged after a negative COVID-19 result on the Polymerase Chain Reaction (PCR) test. He was still dyspneic and dependent on oxygen supplementation at 5 liters per minute upon discharge. The COVID medicines were unknown because the patient was hospitalized in another center.

He has been home for 3 weeks, but the patient and family were concerned about the patient's persistent dyspnea that severely limited his functional capacity and independence. The patient was previously ambulatory and independent in activities of daily living with no co-morbid condition. On virtual physical examination, the patient was found to have dyspnea and tachypnea on activity, wherein the oxygen saturation dropped from 95% to 85% and respiratory rate increased up to 28 cycles per minute after attempting to sit-dangle from a supine position with suprasternal, intercostal and epigastrium retractions. The patient also had frequent coughing when moving. The Barthel Index was 55/100 (i.e., limitations in toileting, bathing, mobilization, transfer, and stair climbing). The sit-to-stand test was not done due to desaturation. Based on the EQ-5D-5L (EuroQOL with 5 dimensions and 5 levels), the patient had severe problems with mobility and daily activities. The pertinent physical examination is summarized in Table 1. The patient was not referred for inpatient rehabilitation because there was no rehabilitation facility in the previous hospital. Based on the examination, the patient was diagnosed with the post-COVID-19 syndrome. The main symptoms were dyspnea and functional decline that persisted for about 2 months after discharge.

Eventually, telerehabilitation was offered to the patient. The patient's consent was recorded through video prior to the teleconsultation. The goals of the telerehabilitation program included the following: (1) reduce the symptoms of resting and exertional dyspnea, (2) improve functional capacity and independence, and (3) wean from oxygen supplementation. The program consisted of the following: breathing retraining (diaphragmatic and segmental breathing that focused on developing breathing control); chest mobility exercises (such as chest expansion exercises with and without holding a towel in line with controlled breathing technique); and respiratory muscle relaxation techniques through gentle passive stretching of the upper trapezius, pectoralis major, and paracervical muscles. The prescription of the exercise was 2-3 sets as tolerated with 10 repetitions and a 2-3-second hold per set as tolerated. All the exercises were done in supine and sitting positions according to the patient's response. The exercise program was terminated if the oxygen saturation fell ≤ 80% or the patient requested to stop. The patient completed the initial two-week program of physical therapy conducted via synchronous, online video-based telerehabilitation for 45 minutes three times a week (a total of 6 sessions).

During the teletherapy, a dedicated physiotherapist contacted the patient using video call via a hospital-based telemedicine platform to virtually facilitate the exercise program prescribed by the physiatrist. There are no technical issues such as the internet connection, the voice, the sound, and the videos during teletherapy. The physiotherapist provided execise instructions, supervision, and monitoring during each session, and properly paced the exercises depending on the patient's tolerance. The vital signs (i.e., blood pressure, heart rate, and oxygen saturation) were measured in person by the caregiver using a sphygmomanometer and oximeter available at home and were recorded by the remote physiotherapist on the medical record for each session. The patient had his daughter as his caregiver, who set up their tablet for each video call, directly supervised

the exercise at home, and measured the vital signs during each exercise. The daughter was taught about vital signs monitoring and safety precautions by the physiotherapist during the first session. Initially, the patient could not tolerate 45 minutes of exercise even when done supine and intermittently (i.e., a cycle of exercise for 10 minutes and rest of 5 minutes for a total duration of 45 minutes). He eventually tolerated the sessions with lesser rest periods (e.g., only 5 minutes in the middle of the therapy session).

After two weeks, the patient was evaluated by the physiatrist through teleconsultation. He showed some improvements in pulmonary symptoms (e.g., need for oxygen supplementation; cough; secretions), Barthel Index score, 5 times sit-to-stand test, and EQ-5D-5L (Table 1). He was found to be needing oxygen support only after performing basic activities of daily living (ADL), such as toilet habits, bathing, and changing clothes. He could walk around the house on his own with a walker. No adverse event was noted.

The patient then continued with another set of 6 telerehabilitation sessions for 2 weeks. The following were added to the program: aerobic exercise using a portable mini pedal for upper and lower extremities for 15-20 minutes; muscle strengthening using a 600-mL mineral water bottle for exercising the upper limbs and ankle weight (1 kilogram) for the quadriceps (i.e., 3 sets with 5-10 repetitions, 3-5-second hold per set); and balance exercises (such as sit-to-stand for 10 repetitions and ambulation using walker for 50 meters). All the exercises were either done in sitting or standing. The total duration of teletherapy was 45 minutes, with the patient resting for 5 minutes after each type of exercise. The indications of exercise termination were the same as the previous exercise program. He was asked to continue the breathing retraining and relaxation exercises on his own even on days between telerehabilitation sessions. All the exercise equipment (portable mini pedal and ankle weight) were bought online by the patient's family.

After a total of 12 telerehabilitation sessions, he was evaluated through teleconsultation with noted improvements in oxygen dependence, cough, functional status, and functional independence (Table 1). His activities were no longer interfered by cough and dyspnea. He could walk around the house independently without a walking aid. The patient was given a home program to continue all the exercises even without supervision from a remote physical therapist.

Discussion

We report the case of an elderly infected by COVID-19 (delta strain), which was highly contagious, presenting with breathlessness that persisted up to the recovery phase. The patient never had COVID-19 immunization prior to the infection. His symptoms of post-COVID-19 syndrome included dyspnea at rest and exertional dyspnea, supplemental oxygen dependence, and functional decline. Post-COVID-19 syndrome in the aged population is affected by several factors, including residual organ damage, the persistence of systemic inflammation, the effects of hospitalization, and associated comorbidities.[9] Immunosenescence and age-related immune remodeling may also be the reason for this susceptibility.[10] In Post-COVID-19 Syndrome, symptoms persist from the time of the acute clinical illness to the recovery phase. Several studies have shown that hospitalized older adults were mostly males who presented with fever (74.6%), cough (35.8%), breathlessness (24%), fatigue (21.8%), and myalgia (19.7%). The most prevalent comorbidities were hypertension (58.4%),

Table 1. Functional status and functional independence before and after telerehabilitation

	Outcome Criteria	Teleconsultation I (Initial assessment)	Teleconsultation II (mid-evaluation after first set of six sessions of therapy)	Teleconsultation III (Final evaluation after second set of six sessions of therapy)
Pulmonary symptoms	Oxygen supplementation at rest in sitting position	1-2 Lpm to reach 97-98% oxygen saturation	1-2 Lpm to reach 97-98% oxygen saturation	Room air
	Oxygen supplementation after performing an ADL	5-6 Lpm to reach 93-94% oxygen saturation	5-6 Lpm to reach 97-98% oxygen saturation	Room air
	Cough	Exercise-induced cough (cough is strong and dry)	Exercise-induced cough (cough is strong and dry)	Exercise-induced cough less frequent
	Secretion	Liquid, whitish	Liquid, whitish	No secretion
Barthel Index		55/100	95/100	95/100
5 Times Sit-to-Stand Test		Not tolerated	30 seconds (with EID)	30 seconds (no EID)
EQ-5D-5L	Mobility	4	3	2
	Self-Care	4	3	2
	Usual Activities	4	3	2
	Pain/Discomfort	1	1	1
	Anxiety/Depression	1	1	1

Lpm, liters per minute; EID, exercise-induced dyspnea; EQ-5D-5L (EuroQOL with 5 dimensions and 5 levels), A standardized measure of health status describing different dimensions of health (Mobility, Self-Care, Usual Activities, Pain/Discomfort, and Anxiety/Depression), rated in a 5-point Likert scale: no problems (1), slight problems (2), moderate problems (3), severe problems (4), and unable to/extreme problems (5)

diabetes mellitus (52.8%), and coronary artery disease (20.8%).[11]

Post-COVID-19 Syndrome is the presence of at least two clinical symptoms over 12 weeks after recovery, its overall prevalence was approximately 9.3% among older adults. Especially in elderly patients, functional status after recovery from acute COVID-19 infection can be compromised due to persistent clinical symptoms and age-related factors.[12-14]

A study by Sathyamurthy et al. showed that the most common symptom of older adults reported 90 days after recovery was fatigue, which was followed by cough and breathlessness.[15] Their population was comprised of hypertensive individuals in 58.4% of cases and those with prior chronic obstructive pulmonary disease in 4%. The study also showed that older adults nearly regained their baseline functional status within 90 days of the acute illness.[15] In our report, the patient regained his near-baseline functional status within 30 days after undergoing a telerehabilitation program.

In lower middle-income countries, such as Indonesia, telemedicine, more so telerehabilitation, was neither widely known nor implemented before the COVID-19 pandemic.[16] The suspension or limited capacity of center-based rehabilitation services in many hospitals, along with the concern about COVID-19 contagion during the pandemic, accelerated the unprecedented adoption of telerehabilitation.[16,17] Catalyzed by the pandemic, telemedicine in Indonesia is now regulated by the Ministry of Health Regulation No. 20 of 2019, but the guideline does not mention about telerehabilitation. Telemedicine in Indonesia is usually implemented for teleconsultation (through video call using a national platform called TEMENIN or Telemedicine Indonesia), teleradiology, tele-ultrasonography, and tele-electrocardiography (through the uploading of documents or results for a remote specialist consultation). Starting in 2017, the platform has been in use by approximately 200 primary healthcare services and hospitals in selected areas. It was originally developed to help deliver health services to more isolated and rural areas, especially those that do not have physical facilities. It was intended to allow people with limited access to healthcare to be diagnosed and treated as soon as possible. The concept of telemedicine is very suitable for Indonesia given its vast, archipelagic, and populous landscape. Unfortunately, TEMENIN is not yet ready to be implemented on a national scale and has not been thoroughly used by the public, especially outside the metropolis area, primarily due to internet connectivity issues and limited digital infrastructure that does not cover remote areas.[18,19]

Many national guidelines from other countries recommend telemedicine as an option for remote screening and, if possible, for providing remote treatment to patients to curtail the high transmission rates of COVID-19 during the pandemic. Telemedicine may be considered electronic personal protective equipment (PPE) by reducing the risk of COVID-19 exposure and spread among patients and clinicians.[20]

With the existence of telerehabilitation, the provision of rehabilitation services can be easier and wider in scope, so it is beneficial for people who cannot come to the rehabilitation center because of various barriers, such as impaired mobility, difficulties in travel and logistics, time constraints, and costs among others.[21] The patient in this case report had limited access to rehabilitation services because there was no rehabilitation center nearby and arranging for transportation was cumbersome, similar to the experience reported in the Philippines.[22] Patients like them with constraints to in-person rehabilitation access can benefit from a telerehabilitation service program. Telerehabilitation services are divided into two categories: virtual assessment (to assess the functional abilities of patients) and virtual therapy (to facilitate therapeutic exercises and interventions from a distance).[22] Telerehabilitation may be performed using any form of Information and Communication Technologies (ICT), as outlined in Table 2.[23,24]

Telerehabilitation has been applied to patients with neurodegenerative disease, heart failure, cerebrovascular disease, chronic obstructive pulmonary disease, geriatrics, and musculoskeletal disorder. The application of telerehabilitation in health care has shown promising results, in terms of functional ability, disability improvement and others.[25-27]

The disadvantage of implementing telerehabilitation is the inability of the patient to accurately replicate the exact exercise regimen taught by the physiatrist and guided by a physical therapist. Other barriers that can be encountered when implementing telerehabilitation are communication barriers and different perceptions when facilitating mirroring techniques during teletherapy sessions. Barriers can also be found in patients with neurological disabilities in operating communication devices. In this current study, there were no adverse events noted, such as desaturation, falls, and muscle soreness.[25,28]

The most challenging experience we had during the telerehabilitation sessions was the difficulty of the patient following exercise instructions via video call. An adult competent caregiver was needed to help the patient follow the instruction step-by-step. The peculiar situation of telerehabilitation in Indonesia was every physiatrist has their own protocol in conducting telerehabilitation because there are no policies, guidelines, or laws that specifically regulate the liability and implementation of telerehabilitation in Indonesia. There are still many challenges to implementing telerehabilitation in Indonesia, such as the cost of each telerehabilitation session (i.e., approximately 13-20 US dollars for each session, while the average household income in Jakarta is 307 US dollars). This patient had a total of 2 teleconsultations and 12 teletherapy sessions in one month, which cost approximately 280 US dollars. This cost is still a challenge to telerehabilitation in Indonesia and there is no solution yet therefore lack of tele-rehabilitation enthusiasts because of the cost.

National health insurance does not cover telemedicine, including telerehabilitation. Other challenges were the internet access, lack of medical devices to monitor patient response, lack of ideal exercise equipment, and a competent caregiver

Table 2. Examples of telerehabilitation techniques and their inherent benefits and limitations

Telerehabilitation method	Examples	Benefits	Limitations
Synchronous	Video call/video conference using Zoom meeting, Google meet, or WhatsApp	Time-efficient Mutual support Individualized The patient can be monitored in real-time	Time-limited Need sophisticated communication tools (camera, speaker, internet network, and devices that support the platform)
Asynchronous	Text messaging or E-mail to send the exercise program instruction	Does not need sophisticated communication tools Cost-effective	The telerehabilitation program cannot be individualized Inability to measure participant's physical performance and compliance The patients cannot be intensively monitored (cannot be done in high-risk patient)
	Video upload	The patient can watch and follow the video whenever they want and as frequently as they want	The telerehabilitation program cannot be individualized Inability to measure participant's physical performance and compliance Cannot be done in high-risk patient (cannot be monitored)
	Certain mobile applications on smartphone for home exercise program	The application can meet a variety of user needs, and facilitate patient adherence by creating an interactive exercise environment that promotes self-efficacy and behavior change through enhanced communication, goal setting, and progress reporting means. Cost-effective	The patient should have a smartphone that supports the application This method is suitable for patients accustomed to using the technology

as supervisor. Based on the author's experience, one of the important eligibility criteria for telerehabilitation for geriatric patients in Indonesia is the availability of home equipment needed to consistently and reliably conduct quality telerehabilitation sessions.

There was only one published paper about the telerehabilitation program in Indonesia. The paper was a case report about the combination of telerehabilitation with conventional therapy in the treatment of bilateral carpal tunnel syndrome (CTS). This case report involved a 51-year-old patient. The telerehabilitation was given for 5 weeks consisting of telerehabilitation (using instant messages and video calls using WhatsApp Messenger every 4-5 days on average, with durations varying from 5-40 minutes to supervise and give feedback on the home education program) combined with conventional therapy (using low-level LASER therapy and Ultrasound Diathermy phonophoresis). The study showed that the combination program was feasible in improving the patient's symptoms and functional ability for a patient with bilateral CTS.[29]

To the authors' knowledge, this case report was the second paper about the implementation of telerehabilitation in Indonesia. The contribution of this paper to the severely scarce local literature is emphasizing the feasibility and safety of telerehabilitation among post-COVID geriatric patients in low-resource settings as long as proper support systems are in place, such as reliable internet connection, and available home medical devices, telecommunication devices, exercise equipment, and a competent adult caregiver. Telerehabilitation can be an innovation to resolve gaps in rehabilitation service delivery following hospital discharge for COVID-19 patients. Further large-scale and more robust studies are needed to establish its effectiveness.

Conclusions

A structured/ systematic telerehabilitation program can improve pulmonary symptoms, functional status, functional independence, and quality of life in 4 weeks. This study also showed that the telerehabilitation program is safe and feasible for geriatric patients with post-COVID-19 syndrome in low-resource settings as long as a proper support system can be provided. This program also can be a suitable solution for patients that cannot personally access rehabilitation services and can reduce exposure to coronavirus infection among healthcare workers and patients.

References

1. Tan J. E-Health Care Information Systems: An introduction for students and professionals. Wiley and Sons; 2005. p. 219. [cited 2022 May 27]. Available from: https://www.yumpu.com/en/www.cse.hcmut.edu.vn
2. Paneroni M, Vitacca M, Bernocchi P, Bertacchini L, Scalvini S. Feasibility of tele-rehabilitation in survivors of COVID-19 pneumonia.

Pulmonology. 2022 Mar [cited 2022 May 23]1;28(2):152-4. Available from: https://pubmed.ncbi.nlm.nih.gov/33893061/ doi:10.1016/j.pulmoe.2021.03.009
3. Keaton L, Pierce LL, Steiner V, Lance KM, Masterson M, Rice MS, et al. An E-rehabilitation Team Helps Caregivers Deal with Stroke. Internet J Allied Health Sci Pract [Internet]. 2004 [cited 2022 May 26];2(4). Available from: https://nsuworks.nova.edu/ijahsp/vol2/iss4/7/ doi:10.46743/1540-580X/2004.1057
4. Knepley KD, Mao JZ, Wieczorek P, Okoye FO, Jain AP, Harel NY. Impact of telerehabilitation for stroke-related deficits. Telemedicine and e-Health. 2021 Mar [cited 2022 May 22];27(3):239-46. Available from: https://www.liebertpub.com/doi/10.1089/tmj.2020.0019 https://doi.org/10.1089/tmj.2020.0019
5. Huang C, Huang L, Wang Y, Li X, Ren L, Gu X, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. The Lancet. 2021 Jan [cited 2022 Jun 1]16;397(10270):220-32. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32656-8/fulltext doi:https://doi.org/10.1016/S0140-6736(20)32656-8
6. van Haastregt JCM, Everink IHJ, Schols JMGA, Grund S, Gordon AL, Poot EP, et al. Management of post-acute COVID-19 patients in geriatric rehabilitation: EuGMS guidance. Eur Geriatr Med. 2022 Feb [cited 2022 Sep 23];13(1):291-304. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8605452/ doi:10.1007/s41999-021-00575-4
7. Carfì A, Bernabei R, Landi F. Persistent symptoms in patients after acute COVID-19. JAMA [Internet]. 2020 Aug 11 [cited 2022 Sep 25];324(6):603-5. Available from: https://jamanetwork.com/ on 09/25/2022 doi:10.1001/jama.2020.12603
8. Vieira AG da S, Pinto ACPN, Garcia BMSP, Eid RAC, Mól CG, Nawa RK. Telerehabilitation improves physical function and reduces dyspnoea in people with COVID-19 and post-COVID-19 conditions: a systematic review. J Physiother [Internet]. 2022 Apr 1 [cited 2022 May 29];68(2):90-8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8994568/ doi:10.1016/j.jphys.2022.03.011
9. Chen Y, Klein SL, Garibaldi BT, Li H, Wu C, Osevala NM, et al. Aging in COVID-19: Vulnerability, immunity and intervention. Vol. 65, Ageing Research Reviews [Internet]. Elsevier Ireland; 2021. [cited 2022 May 30]. Available from: https://www.sciencedirect.com/science/article/pii/S1568163720303408?via%3Dihub doi:10.1016/j.arr.2020.101205
10. Willi S, Lüthold R, Hunt A, Hänggi NV, Sejdiu D, Scaff C, et al. COVID-19 sequelae in adults aged less than 50 years: A systematic review. Vol. 40, Travel medicine and infectious disease [Internet]. USA: Elsevier; 2021. [cited 2022 June 2]. Available from: https://www.sciencedirect.com/science/article/pii/S1477893921000363?via%3Dihub doi:10.1016/j.tmaid.2021.101995
11. Mendelson M, Nel J, Blumberg L, Madhi SA, Dryden M, Stevens W, et al. Long-COVID: An evolving problem with an extensive impact. S Afr Med J [Internet]. 2020 Nov 23 [cited 2022 Jun 1];111(1):10-2. Available from: http://www.samj.org.za/index.php/samj/article/view/13141 doi:10.7196/SAMJ.2020.v111i11.15433
12. Raman B, Cassar MP, Tunnicliffe EM, Filippini N, Griffanti L, Alfaro-Almagro F, et al. Medium-term effects of SARS-CoV-2 infection on multiple vital organs, exercise capacity, cognition, quality of life and mental health, post-hospital discharge. EClinicalMedicine [Internet]. 2021 Jan 7 [cited 2022 May 30];31:100683. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7808914/ doi:10.1016/j.eclinm.2020.100683
13. Li P, Chen L, Liu Z, Pan J, Zhou D, Wang H, et al. Clinical features and short-term outcomes of elderly patients with COVID-19. International Journal of Infectious Diseases [Internet]. 2020 Aug 1 [cited 2022 May 9];97:245-50. Available from: https://www.ijidonline.com/article/S1201-9712(20)30415-X/fulltext doi.org/10.1016/j.ijid.2020.05.107
14. Neumann-Podczaska A, Al-Saad SR, Karbowski LM, Chojnicki M, Tobis S, Wieczorowska-Tobis K. COVID 19 - Clinical picture in the elderly population: A qualitative systematic review. Aging Dis [Internet]. 2020 Jul 23 [cited 2022 May 14];11(4):988-1008. Available from: http://www.aginganddisease.org/EN/10.14336/AD.2020.0620 doi.org/10.14336/AD.2020.0620
15. P S, Madhavan S, Pandurangan V. Prevalence, pattern and functional outcome of post covid-19 syndrome in older adults. Cureus [Internet]. 2021 [cited 2022 May 26];13(8). Available from: https://pubmed.ncbi.nlm.nih.gov/34422503/ doi:10.7759/cureus.17189
16. D Leochico CF. Adoption of telerehabilitation in a developing country before and during the COVID-19 pandemic. Ann Phys Rehabil Med [Internet]. 2020 Nov 1 [cited 2022 Jun 4];63(6):563-4. Available from: https://www.sciencedirect.com/science/article/pii/S1877065720301238?via%3Dihub doi./10.1016/j.rehab.2020.06.001
17. Oh-Park M, Lew HL, Raghavan P. Telerehabilitation for Geriatrics. Phys Med Rehabil Clin N Am [Internet]. 2021 May 1 [cited 2022 May 21];32(2):291-305. Available from: https://pubmed.ncbi.nlm.nih.gov/33814059/ doi:10.1016/j.pmr.2021.01.003
18. Handayani HW, Kusumaningtyas AP. Telemedicine di Indonesia: Langkah Menuju Layanan Kesehatan Universal? [Internet]. Center for Digital Society (CfDS). 2021 [cited 2022 Sep 23];1. Available from: https://cfds.fisipol.ugm.ac.id/id/2021/01/13/telemedicine-di-indonesia-langkah-menuju-layanan-kesehatan-universal/
19. Kementerian Kesehatan Republik Indonesia. Teknologi telemedis terintegrasi untuk layanan medis anda. TEMENIN, Telemedicine Indonesia [Internet]. 2017 [cited 2022 Sep 23];1. Available from: https://temenin.kemkes.go.id/
20. Sari DM, Wijaya LCG. Cardiac rehabilitation via telerehabilitation in COVID-19 pandemic situation. The Egyptian Heart Journal [Internet]. 2021 Dec 29 [cited 2022 Jun 7];73(1):31. Available from: https://pubmed.ncbi.nlm.nih.gov/33779873/ doi:10.1186/s43044-021-00156-7
21. Leochico C, Espiritu AI, Ignacio SD, Mojica J. Challenges to the emergence of telerehabilitation in a developing country: A systematic review. Frontiers in Neurology | www.frontiersin.org [Internet]. 2020 [cited 2022 June 4];1:1007. Available from: https://www.frontiersin.org/articles/10.3389/fneur.2020.01007/full doi:10.3389/fneur.2020.01007
22. Leochico CFD, Valera MJS. Follow-up consultations through telerehabilitation for wheelchair recipients with paraplegia in a developing country: a case report. Spinal Cord Ser Cases [Internet]. 2020 Dec 6 [cited 2022 May 30];6(1):58. Available from: https://pubmed.ncbi.nlm.nih.gov/32632104/ doi:10.1038/s41394-020-0310-9
23. Seron P, Oliveros MJ, Gutierrez-Arias R, Fuentes-Aspe R, Torres-Castro RC, Merino-Osorio C, et al. Effectiveness of Telerehabilitation in Physical Therapy: A Rapid Overview. Phys Ther [Internet]. 2021 Jun 1 [cited 2022 June 3];101(6). Available from: https://academic.oup.com/ptj/article/101/6/pzab053/6131423 doi:10.1093/ptj/pzab053
24. Peretti A, Amenta F, Tayebati SK, Nittari G, Mahdi SS. Telerehabilitation: review of the state-of-the-art and areas of application. JMIR Rehabil Assist Technol [Internet]. 2017 Jul 21 [cited 2022 May 29];4(2):e7. Available from: https://pubmed.ncbi.nlm.nih.gov/28733271/ doi:10.2196/rehab.7511
25. Shenoy MP, Shenoy PD. Identifying the challenges and cost-effectiveness of telerehabilitation: A narrative review. Vol. 12,

Journal of Clinical and Diagnostic Research [Internet]. 2018 [cited 2022 May 30].; Available from: https://www.jcdr.net/articles/PDF/12311/36811_CE[Ra1]_F(AK)_PF1(AJ_AP)_PN(P).pdf doi:10.7860/JCDR/2018/36811.12311

26. Vellata C, Belli S, Balsamo F, Giordano A, Colombo R, Maggioni G. Effectiveness of telerehabilitation on motor impairments, non-motor symptoms and compliance in patients with Parkinson's disease: A systematic review. Front Neurol [Internet]. 2021 Aug 26 [cited 2022 June 4];12:627999. Available from: https://pubmed.ncbi.nlm.nih.gov/34512495/ doi:10.3389/fneur.2021.627999
27. Bernocchi P, Vitacca M, la Rovere MT, Volterrani M, Galli T, Baratti D, et al. Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: A randomised controlled trial. Age Ageing [Internet]. 2018 Jan 1 [cited 2022 June 1];47(1):82-8. Available from: https://academic.oup.com/ageing/article/47/1/82/4097568 doi:10.1093/ageing/afx146
28. Torsney K. Advantages and disadvantages of telerehabilitation for persons with neurological disabilities. NeuroRehabilitation [Internet]. 2003 [cited 2022 May 30];18(2):183-5. Available from: https://content.iospress.com/articles/neurorehabilitation/nre00188 doi:10.3233/NRE-2003-18211
29. Hartantri W, Arfianti L. Combination of telerehabilitation with conventional therapy in the treatment of bilateral carpal tunnel syndrome: a case report. Surabaya Physical Medicine and Rehabilitation Journal [Internet]. 2020 Aug 31 [cited 2022 June 3];2(2):73. Available from: https://e-journal.unair.ac.id/SPMRJ/article/view/21162 doi:10.20473/spmrj.v2i2.21162