



Telemedicine's Impact on Mental Health and Physical Disorders

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Abstract

The utilization of telemedicine increased 766% at the beginning of the pandemic and became an integral part of access to healthcare. In order to prevent the spread of COVID-19, healthcare providers maintained their patients' access to care by conducting visits through video conferences. Telemedicine improves patients' management and treatment of chronic conditions such as depression, anxiety, diabetes, chronic obstructive pulmonary disease, and hypertension due to increased access to care and lower associated costs. The use of online programs in telemedicine such as adapted virtual cognitive behavioral therapy and applications accessible through smart phones allowed patients to treat and address ongoing challenges with mental health disorders such as depression and anxiety. Digital interventions with self-management programs have created advancements for patients suffering from type 2 diabetes mellitus, chronic obstructive pulmonary disease, and hypertension. Telerehabilitation has allowed patients with various physical disorders to exceed their treatment adherence and have access to constant medical support which assists medical care. Although telemedicine has offered accessibility, lower income patients are challenged by less support and privacy for telemedicine visits. The utilization of telemedicine has played an important role in the way patients approach and manage their chronic diseases.

Future research on how racial and ethnic groups are impacted due to the cost of technology equipment could improve the challenge for different age groups who currently face communication barriers and other safety and security concerns.

I. Introduction

New technologies with advanced digital platforms have enabled patients to improve their health care and access to treatments ([Haleem et. al., 2021](#)). The World Health Organization defines telemedicine as "the delivery of health care services at a distance using electronic devices implies for 'the diagnosis, treatment, and prevention of disease and injuries, research and evaluation, [and] education of health care providers' to improve well-being" ([Arafrat et al.,](#)

[2021](#)). It enables patients to obtain medical care in a more efficient manner because it accommodates the schedule of both the healthcare provider and the patient ([Haleem et al., 2021](#)). Thus, telemedicine has increased the number of patients that healthcare providers are able to treat without physically being present. This progressive way of delivering medical treatment allows patients ease of access to care to receive effective treatment in a safe environment and has the potential to improve their overall long-term health ([Haleem et al., 2021](#)). Importantly, previous studies show that patients feel confident that they are acquiring quality treatment during their virtual appointments ([Haleem et al., 2021](#)). Due to the satisfaction of patients with telemedicine, there are multiple diseases of psychological and physical etiology that are amenable to treatment through a telemedicine approach such as depression, anxiety, Type 2 diabetes mellitus (T2DM), chronic obstructive pulmonary disease (COPD), and hypertension.

Specifically, telemedicine is a notably effective option for treating mental health disorders ([Arafrat et al., 2021](#)). Due to the COVID-19 pandemic, people faced major disruptions to their daily lifestyle which, for many, had a negative impact on their mental health. The fear of the unknown, isolation, and social distancing resulted in severe psychological stress ([Bertollo et al., 2023](#)). For those patients who had preexisting mental health conditions, the pandemic exacerbated their issues ([Neelam et al., 2021](#)). More specifically, patients diagnosed with depression, a mood disorder that can affect how a person feels, interacts, and thinks ([NIMH, 2023](#)). While, generalized anxiety disorder (GAD), having “persistent, excessive, and unrealistic worry about everyday things” ([Munir et al., 2024](#)) comprised the population that utilized telemedicine on a larger scale ([Bashshur et al., 2016](#)). Through telemedicine, mental health services were more accessible for patients. Patients could receive treatment from the privacy of their homes, helping to avoid the perceived stigma of accessing mental health care ([Arafrat et al., 2021](#)). Moreover, telemedicine treatments such as telepsychotherapy, or virtual talk therapy, is centered on ways for patients to manage their life problems and telepsychiatry, which focuses on prescriptions written by a medical doctor for mental health conditions, are successful options that focus on reaching a patient's mental stability ([Nazemi et al., 2023](#)).

In addition to telemedicine's extensive use in mental health, it can also provide healthcare services for physical diseases such as T2DM, COPD, and hypertension. Diabetes mellitus, a widespread prevalent disease, is a chronic metabolic disorder which is a result of impaired insulin secretion ([Diabetes Care, 2013](#)). Telemedical self-management programs are strategies to monitor the patient's blood glucose levels (HbA1c), body weight, blood pressure (BP), and quality of life. Overall, studies have indicated that telemedical interventions are effective in helping to maintain lower HbA1c levels in patients with T2DM ([Storch et al., 2019](#)). Telemedical treatments also benefit those who are suffering from chronic obstructive pulmonary disease (COPD), a set of diseases that cause airflow blockage and breathing problems. Several patients with this progressive lung disease are not able to access or finish pulmonary

rehabilitation, which is an essential part of the management of COPD as it is helpful in improving exercise volume and quality of life in patients with COPD. Telerehabilitation is a method used by patients with COPD that involves training at home with a supervised physiotherapist. Studies have indicated that telerehabilitation reduces hospital readmissions and expands the availability of pulmonary rehabilitation and management strategies ([Zanaboni et al., 2023](#)). Moreover, telemedicine also provides treatments for individuals diagnosed with hypertension, a cardiovascular health condition synonymous with high BP. An alternative treatment for this disease is telemonitoring which measures and tracks patterns in BP trends while allowing healthcare providers to remotely access and alter their patient's medications and treatment regimens. Telemonitoring impacts patients' treatment plans and healthcare providers' courses of action.

Overall, advanced telemedicine technologies are being explored in the healthcare industry in order to increase access to quality care for patients in rural areas or areas with fewer healthcare providers. Telemedicine can reduce patient visits through video conferencing or other virtual technologies. Therefore, telemedicine allows for better time management and flexibility, for both the patient and the provider, as well as reducing costs surrounding care. The evolving access to improved healthcare treatment, convenience, and reduced stress with telehealth has led to increased patient satisfaction and outcomes related to mental and physical health disease management ([Haleem et. al., 2021](#)).

II. Materials and Methods

This study consists of a systematic review that addresses the question: *How has telemedicine had an impact on the management of chronic diseases such as mental health disorders, physical disorders and access to care?* An encompassing search of existing systematic reviews and randomized control trials (RCT) were organized in order to recognize studies that have explored the relationship between telemedical treatments and chronic disorders. A structured search involving databases such as PubMed and PsycINFO was conducted using specific relevant words including telemedicine, mental health disorders, and physical disorders. Selection criteria for articles and trials focused on telemedical treatments, such as teletherapy and telemonitoring, and their direct results on mental health and physical disorders. Specifically, trials that investigated telemedicine's efficiency, effectiveness, and patient satisfaction were prioritized. Data from the randomized controlled trials were selected including the study's design plan, participant demographics, outcomes, and reasoning for findings. Using all of the results of the trials and the information gathered, this literature search allowed for a comprehensive outlook on the impact of telemedicine.

Search strategies

An electronic search without time or language restrictions was conducted using Pubmed, Google Scholar, and other published articles. The reference lists of included studies and relevant reviews were also searched for other potential studies. The detailed search strategies were as follows: #1 telemedicine, #2 tele-psychotherapy, #3 telemedicine AND interventions, #4 interventions, #5 tele-rehabilitation, #6 telehealth, #7 telehealth AND chronic disorders

III. Discussion

Mental Health Disorders

In 2020, the declaration of the COVID-19 pandemic drastically changed the way we interact, work, and live. Several measures were enforced by governments in order to control the spread of the virus which then created new challenges for people to adjust to. Unemployment, social distancing, social isolation, closed schools, and an increase in deaths became the new reality. Due to the rapid spread of the virus, restrictions drastically altered people's social interactions and caused financial strain on middle and lower income families, both of which resulted in an increased level of stress and anxiety. In addition, social isolation due to lockdown measures was associated with feelings of uncertainty and fear of the unknown, which ultimately lead to an abnormally high rate of depression ([Sawicka et. al., 2022](#)). According to Otte et al. (2016), depression can be defined as “a debilitating disease that is characterized by depressed mood, diminished interests, impaired cognitive function and vegetative symptoms, such as disturbed sleep or appetite”. Depression can cause debilitating symptoms such as feelings of hopelessness or worthlessness, difficulty concentrating, or decreased energy which can affect how a person functions, thinks, and acts. This common disorder can also include other changes in mood behavior such as increased anger, becoming withdrawn, and greater impulsivity (NIMH, 2023). Individuals with depression face varying severities of disease and clinical symptoms, as well as presentation at any age. Depression can frequently occur in adolescence with the main symptom being irritability, but many mood disorders may present in this fashion (NIMH, 2023). More specifically, Generalized Anxiety Disorder (GAD) produces panic, worry, and a constant feeling of being overwhelmed which can manifest in childhood and young adulthood. GAD is characterized by persistent, excessive, and unrealistic worry about benign things ([Munir et al., 2022](#)). These mental health disorders require various therapy treatments in the form of pharmacotherapy and psychotherapy, in order to maintain emotional regulation.

Telemedicine is a digital-based platform that delivers various aspects of health services such as prevention, therapy, monitoring, and medical care. It has been an effective modality in offering remote access to mental health services for those suffering from depression. For example, telepsychotherapy, or virtual therapy, is a digital session managed by a licensed mental health professional during which the patient is able to discuss their feelings and thoughts



([Kaplan, 1997](#)). Telepsychotherapy's main focus is to provide patients with a platform to talk through their mental health concerns and deliver evidence-based therapies that have played a major role in treating mental health disorders. During telepsychotherapy sessions, therapists utilize various approaches, such as cognitive behavioral therapy (CBT) which assists patients in identifying harmful thought patterns that may have a negative impact on their emotions and actions ([Nakao et al., 2021](#)). CBT helps advance “balanced thinking” in order to better one’s ability to cope with stress. In order to increase accessibility to CBT, various virtual-based CBT programs have been produced, allowing patients to access them through digital devices such as phones and computers ([Kambeitz-Ilankovic et al., 2022](#)). For example, virtual reality exposure-based cognitive behavioral therapy (VRE-CBT) uses virtual reality technology in order to provide CBT used to strengthen emotion regulation. This telemedical treatment allows patients to perceive immersive visuals and take part in “skill-building” situations which can produce an inclusive approach to therapy alongside mind-body exercises ([Seon et al., 2023](#)). Telepsychotherapy provides an accessible alternative for patients to receive therapy from the comfort of their own home. In addition, telepsychiatry, another telemedical treatment, involves a licensed psychiatrist or other licensed prescriber providing various services such as psychiatric evaluations, medication guidance, diagnoses, and patient instruction through virtual communication ([Forte et al., 2021](#)). Thus, telemedicine and in-person treatments both aim to diagnose mental health issues and help patients improve their psychological and emotional well-being. Virtual therapy and in-person mental health professionals both employ identical therapeutic approaches, such as CBT and psychodynamic therapy, in order to help their patients overcome their mental health challenges.

In response to the tremendous need for medical services, the healthcare industry adapted to virtual behavioral health treatments to provide high-quality mental health care for patients suffering from mental health disorders. Adhering to treatment is an important factor in improving outcomes, which is why providing evidence for patient satisfaction and treatment attrition is a vital part of showing the benefits of telemedicine. Egede et al. (2016) performed a clinical trial that analyzed the impact of telepsychology. Two hundred forty-one elderly patients with depression were randomly assigned to either telemedicine or same-room treatment. The main outcomes were quality of life, satisfaction, treatment credibility, and service delivery perception, as assessed by various surveys at four weeks, eight weeks, three months, and twelve months. Results showed that telemedical treatments were a viable alternative with no significant differences between in-person and telehealth groups in depressive symptom reduction. The authors also conducted a trial in order to measure teletherapy’s impact on patient satisfaction and treatment credibility which revealed that there was no statistically significant difference between the two treatments reported by patients. This trial provided evidence that telemedicine has a similar impact on patient satisfaction and patient’s perspective on healthcare compared to in-person treatment. The findings from Egede et. al’s (2016) clinical trial demonstrated that telemedicine is an effective alternative treatment for patients with symptoms



of depression. With the urgent need for an effective and feasible alternative to in-person mental health treatment during the pandemic, telemedicine is a viable option and an impactful form of treatment. Patients diagnosed with depression have benefited from the emergence of telemedicine as patients are able to share their thoughts and emotions with their therapists remotely. A study that expands to patients suffering from various mental health challenges, conducted by Bulkes et al. (2022), evaluates the efficacy of telemedicine as a successful alternative for delivering quality care and treatment. The authors analyzed the clinical outcomes of patients who received telemedical mental health treatments during the COVID-19 pandemic and compared their outcomes to those who received in-person care before the pandemic. The outcomes were measured weekly or biweekly with the Quick Inventory of Depressive Symptomatology-Self-Report (QIDS-SR) and the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q). Findings conveyed that there were no notable variances in assessments between telehealth and in-person treatments, suggesting that telemedicine is a viable treatment distribution method. Both in-person and telemedical treatment patients exhibited equivalent reduction in depressive symptoms and revealed significant increases in self-reported quality of life. Several studies have shown that telemedicine is not inferior to in-person healthcare and that there is no significant difference in quality of care between receiving virtual or in-person care. One such study, a RCT, determined the effectiveness of virtual CBT in comparison to in-person CBT ([Stubbings et al., 2013](#)). Twenty-six patients who were diagnosed with a mood or anxiety disorder were assigned to receive 12 sessions of either virtual CBT or in-person CBT. Patients' symptoms of anxiety, stress, depression, and quality of life were measured using questionnaires before, after, and six weeks following treatment. The results of Stubbing et al.'s (2013) study indicated that CBT was successful in decreasing symptoms of depression, anxiety, and stress and increasing quality of life in both in-person and virtual conditions with no significant differences between the two. This RCT supports the findings of equal patient improvement from in-person and telemedicine therapy.

Another systematic review presented findings on whether individual psychiatric outpatient interventions for adults using telemedicine are similar to in-person treatment efficacy ([Shaker et al., 2023](#)). The systematic review showed that psychiatric treatments through telemedicine for anxiety disorders were equivalent to in-person treatments in terms of treatment efficacy and patient satisfaction. Therefore, therapists utilize various telemedical approaches such as computerized clinical decision support systems (CCDSS) in order to provide patients suffering from mental health disorders with efficient and accessible treatment options. CCDSS are designed to generate individualized recommendations for patients via software algorithms. A collection of RCTs involved four general practice clinics, two allocated to experimental protocols and two allocated to control groups ([Balestrieri et al., 2020](#)). Sixty-six patients were placed in the experimental group which received treatments from the CCDSS and other various telemedical approaches while 32 patients were placed in the control group which received regular treatment as usual determined by their healthcare providers. The primary outcome was clinical remission

at six months while the secondary outcomes were quality of life and patients' satisfaction. All patients reported positive satisfaction at six months. The study revealed that a combined CCDSS and telemedicine approach may be more effective than an in-person treatment for patients with depression. These studies and clinical trials indicate that telemedical treatments are effective in treating patients with mental health disorders and have similar approaches and results compared to in-person treatment options. Similar results were shown in the Graham et. al. (2020) randomized control trial where they assessed telemedicine's efficacy of a mobile intervention platform, IntelliCare, for patients diagnosed with generalized anxiety disorder or depression. The digital intervention consisted of a series of apps delivered over eight weeks while control participants received regular treatment for eight weeks before receiving the digital platform. A greater proportion of the patients who received the intervention platform versus the control group, achieved recovery from depression and anxiety. The use of the virtual platform was rising with a median of 93 and 98 sessions among participants with depression and anxiety compared to in-person sessions. The findings also supported the hypothesis that the mobile intervention app was effective and successful for depression and anxiety among patients. In conclusion, telemedical treatments, such as telepsychotherapy and telepsychiatry, have become effective alternative treatments to in-person care by providing increased accessibility, feasibility, and support for patients seeking psychological guidance by removing barriers such as transportation, child care, and affordability. Patients are able to communicate with their therapist or psychiatrist regardless of their location or schedule. These telemedical treatments play a major role in expanding accessibility of mental health services to a wider population and reducing the stigma related to finding mental health support.

Physical Disorders

One of the most common types of chronic metabolic disorders, Type 2 Diabetes Mellitus (T2DM), occurs when there is deficient insulin secretion from pancreatic β -cells and when insulin-sensitive tissues do not have the ability to respond correctly to insulin. This is a hormone that stimulates glucose uptake into cells for energy usage. T2DM can lead to damage to the kidneys, heart, skeletal muscle, nerves, and brain ([Galicia-Garcia et. al., 2020](#)). The development of T2DM can occur at any age, however; it occurs frequently in middle-aged and older people starting at 45 years old. According to the Centers for Disease Control and Prevention, around 38 million Americans have diabetes (about 1 in 10), and approximately 90-95% of them have Type 2 diabetes ([CDC](#)). Patients with a prior family history of diabetes, high blood sugar, or obesity are more likely to develop T2DM. This chronic metabolic disorder can cause several symptoms such as increased thirst and hunger, blurred vision, numbness in feet and hands, and fatigue ([NIH, 2017](#)).

The management of T2DM involves a wide approach that addresses lifestyle changes and pharmaceutical regimens. Healthy lifestyle changes can play a major role in one's

treatment plan, which includes a nutritious and balanced diet, consistent exercise, and maintaining a healthy body weight. Observing and monitoring blood sugar levels are crucial components to the prevention of T2DM which require strict self-monitoring and commitment to taking prescribed oral pharmaceutical medications, such as metformin and sulfonylureas ([Mayoclinic, 2023](#)) that alter a diabetic patients' handling of and response to insulin. The development of injectable medications such as glucagon-like peptide 1 receptor agonists (GLP-1 receptor agonists) and sodium-glucose cotransporter-2 inhibitors (SGLT2 inhibitors) have allowed patients to better adhere to diabetic therapies. GLP-1 receptor agonists slow digestion and lower blood sugar levels while SGLT2 inhibitors prevent the return of glucose into the bloodstream which results in glucose being removed from the body via urination. These injectable medications aim to reduce the chances of a stroke or heart attack ([Mayo Clinic, 2023](#)). In addition, a variety of innovative therapies are used if blood glucose targets are not achieved with lifestyle changes and medications. For example, insulin therapy is highly individualized according to patients' blood glucose patterns. Frequent follow-up care can help support patients to manage and adhere to their treatment regimen.

However, due to the emergence of the COVID-19 virus, new challenges arose for people who were immunocompromised. Patients with preexisting conditions, such as diabetes, had an increased risk of hospitalization, mortality, and complications. As a result, T2DM patients restricted themselves by staying home while trying to maintain their regimens. Public health measures were put in place which restricted access to daily diabetes care from healthcare providers, self-management treatments, and medications. These drastic changes had a negative impact on patients' strict lifestyle treatments and emotional well-being. However, the emergence of telemedicine allowed T2DM patients to virtually communicate with their healthcare providers in order to maintain their health. The rapid development of telemedicine has led to new and efficient strategies by applying telemedicine to a wide range of diabetes care approaches which enhance clinical practices beyond the pandemic ([Rosta et al., 2023](#)).

Further, Storch et al. (2019) performed a RCT that evaluated the effectiveness of telemedicine-assisted self-management programs targeted at T2DM patients by measuring their glycated hemoglobin (HbA1c) levels. Patients with T2DM were placed in intervention groups where they received digital coaching, which was based on the individual's needs, in order to enhance motivation and self-management. The control patients received regular care and no additional treatment. The authors assessed the findings of the diabetes program after three months which showed significantly greater declines in HbA1c levels compared to the control group. Telemedical patients demonstrated improvements in Diabetes Self-Management scale scores and body mass. This study supported the results of another RCT by Yin et al. (2017) that showed promising reductions in A1C and fasting blood glucose levels at the end of a six-month telemedicine intervention when compared to diet and exercise guidance. The results concluded

that patients with T2DM can benefit from telemedicine-assisted self-management programs, which provide various effective treatment options ([Storch et al., 2019](#)).

Several studies have shown that telemedical treatments and interventions do not have a drastic difference in blood glucose levels between receiving virtual or in-person care. The Yin et al. (2017) RCT focused on evaluating the effect of telemedicine management of diabetes in patients categorized in the weight range of obesity with T2DM during the COVID-19 pandemic. Patients were either assigned to a telemedical group or an outpatient clinic group where they received diet and exercise guidance and glucose monitoring for six months. Self-Rating Depression Scale (SDS) scores and blood glucose observations were assessed at 22 days and at the end of three and six months. The control group's SDS significantly increased while the intervention group exhibited lower SDS scores. On the 22nd day of the trial, the fasting blood glucose (FBG) levels of the telemedical patient group were significantly lower than the control group which received baseline care. After the six months, data indicated that HbA1c and FBG levels in the intervention group decreased compared with those in the control group. These findings indicate that telemedicine is a beneficial alternative for T2DM patients with the goal to manage their blood glucose regulation and weight loss.

With the increased demand for telemedicine, the use of tele-monitoring could improve maintenance of healthy lifestyles for patients with T2DM. Tele-monitoring can be utilized to help patients with exercise adherence which is important for the management and prevention of T2DM. Marios et. al. (2012) aimed to focus on improving exercise adherence, patients' VO₂ and HbA1c levels, and quality of life in an exercise program with people diagnosed with T2DM. Thirty-nine patients with T2DM were randomized to tele-monitoring or control groups and were requested to fulfill six months of exercise training. The tele-monitoring group monitored their exercise heart rates and received weekly telephone calls from an exercise physiologist. The group had almost three times as much weekly exercise, resulting in improved VO₂ levels compared to the control group, without creating any significant differences in HbA1c or quality of life. The difference in exercise quantity was inadequate to the improvement of glycemic control regimens, but not necessarily to improvement of HbA1c levels. A reason for this finding could be due to the relatively small sample size used in this study. The tele-monitoring group had a mean of five years younger, less of the patients used insulin, and were more likely to be male in relation to the control group. In addition, prior studies had often demonstrated that peak modifications in glycemic control, quality of life, and VO₂ levels are short-term outcomes. However, the findings show that tele-monitoring may be an effective approach to enable people with T2DM to meet exercise training guidelines and adhere to their treatment regimens. Telemedicine-assisted self-management programs also aim to supply patients suffering from T2DM with virtual aid and resources to motivate patients to maintain their treatment course and regimens. Healthcare providers use different patient management methods, such as tele-monitoring, which tracks and monitors a patient's health metrics and exercise adherence. It provides successful solutions in offering digital access to self-management programs and

interventions for those diagnosed with T2DM. For example, telemedical assisted self-management programs involve virtual visits with healthcare providers, statistical data monitoring of blood glucose levels and data from insulin pumps, virtual messaging, and coaching ([Dhediya et al., 2023](#)). Patients are given interactive devices and sensors that are able to observe their symptoms and data on basic vital signs for pulmonary conditions, cardiac diseases, and hypertension. The variety of telemedicine usage in diabetes management is wide and continuously improving for patients to experience better health outcomes and quality of life.

Another significant factor to illness, death, and healthcare-use worldwide is chronic obstructive pulmonary disease (COPD), which is a progressive respiratory disorder that is defined by lung airflow limitation and tissue destruction. This airflow limitation is correlated with structural lung accommodations as a result of chronic inflammation which causes airway narrowing and decreased lung recoil ([Agarwal et al., 2023](#)). Patients who have COPD develop a mixture of both emphysema and chronic bronchitis in varying proportions depending on the patient. Emphysema evolves when there is harm to the walls between the air sacs and it becomes more difficult for one's lungs to move air out of the body, while bronchitis is caused by continuous irritation and inflammation in the tubing of the airways which produces a large amount of thick mucus ([NIH, 2023](#)).

Key contributors to the development and advancement of COPD are extended exposure to harmful air pollutants, such as tobacco in the home and workplace, genetic factors, and respiratory infections. Breathing becomes more difficult for 16 million Americans who have been diagnosed with COPD ([CDC, 2023](#)). Those with COPD frequently display common symptoms of coughing or wheezing, excess phlegm, shortness of breath, and dyspnea which is a feeling of running out of air and of not being able to breathe quickly enough ([Hashmi et al., 2023](#)). It is mostly present in women, as well as smokers and those greater than age 40, as they tend to be more vulnerable to the consequences of other harmful air pollutants. This detrimental disorder involves several different treatment approaches focused on improving lung function, lessening airflow restriction, decreasing respiratory symptoms, and enhancing one's quality of life. One of the most important steps of treatment is smoking cessation which can prevent a patient's COPD condition from getting worse. In addition, medication is one of the first treatment choices prescribed by healthcare providers that play a major role in relieving symptoms. COPD medications, such as bronchodilators, aim to ease the muscles around the airways in order to open them, while inhaled corticosteroids (ICS) focus on suppressing inflammation, swelling, and mucus in the airways ([American Lung Association, 2024](#)). Furthermore, pulmonary rehabilitation programs are provided in order to teach COPD management strategies to improve quality of life. Strategies may include methods that teach patients how to conserve their energy, breath better, and improve exercise adherence ([Mayoclinic, 2020](#)). Pulmonary rehabilitation programs can enhance a patient's strength, lessen symptoms of anxiety or depression, and increase ability to manage and participants in daily activities ([Mayoclinic, 2020](#)). Lastly, oxygen therapies are

frequently recommended by healthcare providers if there is a lack of oxygen in the blood. Oxygen therapy can be delivered through a cannula which is a small tube that sits inside your nostrils, a face mask, or a tracheostomy tube. These various treatment alternatives reduce airflow obstruction, prevent complications, and ensure management of COPD ([Cleveland Clinic, 2022](#)).

Telemedical COPD treatments have become critical, especially for patients suffering from COPD as they were challenged with compromised immune systems. While in-person follow-up and check-in appointments presented complications and risks to immunocompromised patients, telemedical treatments allowed healthcare providers to offer more accessible alternatives in order to manage remote conferences, diagnose patient's symptoms, and modify COPD treatment regimens. Tele-rehabilitation consists of remote rehabilitation services with healthcare providers ([Theodoros et. al., 2008](#)). One study that explored the effectiveness of such an intervention was conducted by Zanaboni et al (2023). During these rehabilitation meetings, healthcare providers can offer virtual exercise programs tailored to the patient, teleconsultations where respiratory therapists can adjust a patient's treatment plan, and remote monitoring of the patient's vitals such as respiratory rate, oxygen levels, and heart rate. This alternative approach enables patients with COPD to receive pulmonary rehabilitation from the privacy of their own homes, overcoming the difficulties of accessibility ([Cox et. al., 2021](#)).

Due to the pandemic's detrimental effects on patient's need for strict treatment regimens, advanced remote healthcare treatments were transformed in order to supply patients suffering from COPD with effective care. Zanaboni et. al. (2023) conducted a RCT with the intent to compare long-term telerehabilitation with standard in-person COPD care. Patients with COPD were assigned to three groups: either telerehabilitation which included treadmill training at home supervised by a physiotherapist, unsupervised training where patients accomplished unsupervised treadmill exercises at home, or control group which received regular care as usual. The main result of the study was the number of hospitalizations and visits to the emergency department. After one year, results indicated that the rate of hospitalizations and emergency department presentations was lower in the telerehabilitation and unsupervised training group than in the control group. Patients that were involved in the interventions maintained clinically significant improvements in exercise capacity. From the findings of Zanaboni et. al. (2023), long-term telerehabilitation and unsupervised training at home for COPD are both effective in decreasing hospital readmissions and are able to expand the availability of pulmonary rehabilitation and maintenance strategies.

In addition, diverse telemedical approaches such as digital mobile health (mHealth) techniques utilized by patients with COPD are able to potentially support the delivery of self-management interventions for COPD. Bentley et. al. (2020) developed a mHealth intervention using telehealth technologies delivered through a smartphone app and an activity

tracker in order to assist patients suffering from COPD to manage or increase physical exercise after undertaking pulmonary rehabilitation. This study primarily focused on the feasibility and effectiveness of utilizing the mHealth interventions for the management of physical activity for patients with COPD. Thirty patients with COPD were assigned to either the intervention or control group and were monitored for eight weeks to see their progress. Outcome measures such as questionnaires and physical activity measures were assessed at the beginning and end of pulmonary rehabilitation. Participants who were able to complete the study expressed positive feedback about the technology and felt their health had benefited from the technology that helped them achieve exercise adherence. However, signs of dissatisfaction among some control group participants regarding their assignment were reported. From these results, mHealth interventions are shown to be beneficial in helping people with COPD self-manage their physical activity levels. Both of the aforementioned studies demonstrated the impact that telemedicine can have on chronic disease management while incorporating innovative technologies for quality healthcare ([Bentley et al., 2020](#)) ([Zanaboni et al., 2023](#)).

A critical cardiovascular health condition that affects millions of people is high BP, which is commonly known as hypertension. This significant risk factor is characterized by the force of blood pushing against the artery walls at a high level which damages the arteries over time and can lead to serious complications such as a heart attack. With its covert characteristics, hypertension is known as the “silent killer” as it could develop with no signs or symptoms. In 2023, the World Health Organization estimated that 46% of adults with hypertension do not believe they have it as they are not aware of their serious condition. There are two types of hypertension: primary and secondary. Primary hypertension is the more common type of high BP that presents itself in about 90% of all adult cases. Although primary hypertension does not have a specific cause, several genetic and environmental factors assemble to cause it, including unhealthy eating patterns, lack of exercise, or family history ([Cleveland Clinic, 2023](#)). On the other hand, secondary hypertension is caused by different medical conditions or medications such as immunosuppressants and contraceptives. Individuals that are more prone to the development of hypertension are individuals with a family history of hypertension or other cardiovascular diseases, individuals over the age of 55, and individuals that have unhealthy lifestyle choices such as poor diet and alcohol consumption. If left untreated, hypertension may lead to serious health problems including, coronary artery disease, stroke, peripheral artery disease or heart attack. However, modifications to patients’ lifestyles can help maintain and control hypertension. Adopting a heart-healthy diet with less sodium, receiving consistent physical activity, limiting alcohol consumption, and maintaining a healthy weight can assist hypertension patients. Regular monitoring and frequent check-ins are necessary to successfully manage hypertension and decrease risks of complications. In addition, BP medication is used to treat hypertension depending on the patient’s health and condition. Common BP medications are angiotensin II receptor blockers (ARBs) and angiotensin-converting enzyme (ACE) inhibitors

which aim to relax blood vessels while blocking the natural chemicals that cause vasoconstriction ([Cleveland Clinic, 2023](#)).

Telemedical services offered patients with hypertension an efficient platform that allowed them to monitor their BP in the comfort of their own homes with digital BP monitors. The results are then delivered to the patient's healthcare provider remotely. Telemonitoring provides continuous knowledge of patterns in BP trends. This alternative allows healthcare providers to virtually access and alter their patient's medications and treatment regimens in order to control the patient's BP. Patients are able to become more engaged in their treatment plans as they learn how to interpret their BP readings and data over time. Overall, telemonitoring positively impacts patients' treatment plans and healthcare providers' courses of action ([NIH, 2022](#)).

Due to their strict lifestyle modifications, hypertensive patients are challenged to adhere to their regimens. In order to analyze the telehealth strategy that aims to increase the adherence to the treatment of hypertension, Santos et al. (2013) conducted a pre-post study that involved 502 hypertensive patients in two of the Family Health Units. Web conferences with seminars addressing the treatment adherence of hypertension were offered for six months to the patients with hypertension. Adherence to antihypertensive drugs, a low salt diet, and physical activity were measured using specific questionnaires. Assessments of rates of adherence were completed before and after a continuing education program (CEP). Findings showed that the adherence to antihypertensive drugs and a low salt diet improved after the CEP. Preliminarily, this telehealth strategy suggests a positive impact on hypertensive patients ([Santos et al., 2013](#)).

Telemedicine's effectiveness in hypertension management, emphasizing lowering BP, has the potential to change future healthcare treatments for patients with hypertension. Kerai et al. (2023) assessed the strengths and weaknesses of telemedicine in hypertension control. The primary outcome of the study is to be able to recognize the proportion of patients with improved hypertension control through improvements in BP comparing in-person clinic BP to telehealth visit home BP to the last BP recorded at the end of study period. In-person BP prior to telehealth visit, home BP, and last recorded BP at the end of the study period were measured for patients across all three BP range groups: improved, same, and worse BP. There was a significant difference found between the first in-person BP measurement and the telehealth BP measurement, but not between the first and last measurements. There were several factors that may have affected this study such as antihypertensive medication, changes during in-office visits, white coat hypertension, and inaccurate measurement of in-office BP. While the results of this study did not show a significant reduction in BPs between the first and last appointments, the physicians in this study were able to make adjustments in real time while participating in patient-focused care. It is unclear whether this intervention provided clear clinical benefit, but it contributes to the idea that telemedicine allows for collaborative and productive decision making between patient and physician.



IV. Limitations

While telemedical treatments can be effective, efficient and cost-effective alternatives for delivering quality healthcare services to patients in rural areas or areas with provider shortages, there are several barriers involving the use of technology among older patients. There is also a challenge for individuals in underserved areas that lack access to digital devices and reliable internet. Additionally, privacy and data security are an issue as telemedical platforms are not entirely safe from data breaches and hackers ([Gajarawala et. al., 2021](#)). This is an important consideration as patients and healthcare providers have to believe that their healthcare information during telehealth services remains private and secure. Another potential limitation to telemedical treatments is the accuracy of data communication as the virtual frequency affects the accuracy of physical function measurements which can result in practitioners making clinical treatment decisions based on inaccurate patient data ([Gajarawala et. al., 2021](#)). Further, patients may feel more detached from their therapist during telemedicine treatments. During virtual sessions, therapists may not be able to capture their patient's body language or non-verbal cues similar to physicians that cannot use the physical exam as part of their clinical decision making process. As a result, it could possibly inhibit the therapist's ability to fully interpret the patient's feelings and emotions. In addition, telemedicine allows healthcare providers to perform their services from the comfort of their own home which can interfere with their personal time. Providers have the ability to meet patients remotely during non-work hours which can blur the line between work and home ([Wright et. al., 2022](#)). Although virtual sessions may restrict therapist's ability to recognize non-verbal cues in their assessments, telemedicine platforms provide several remote approaches for therapists to interpret their patient's emotions.

V. Conclusion

The emergence and evolution of telemedicine has become a transformative factor in the healthcare industry as it has offered greater accessibility to medical treatments and services for patients who are diagnosed with mental health and physical disorders. Telemedical platforms allow for healthcare providers to communicate remotely, offer digital consultations, and improve patient outcomes. Telemedicine has enhanced the use of mental health services which offers patients suffering from depression or anxiety a way to contact their therapist or healthcare provider from the comfort of their own home. Mental health treatments such as telepsychotherapy and telepsychiatry are successful treatment options that focus on targeting a patient's mental stability. Findings from the studies indicate that telemedical treatments have become effective alternative treatments to in-person care by providing increased accessibility, feasibility, and support for patients seeking psychological guidance by removing barriers such as transportation, child care, and affordability. Moreover, telemedical mental health treatments supply patients with more privacy, which can be a key factor for patients who are hesitant to



seek mental health services due to the fear of judgment. The feeling of confidentiality motivates more patients to ask for support for their mental health disorders, which may lead to the improvement of mental health wellbeing in communities. In addition, telemedicine has provided patients suffering from chronic physical disorders such as T2DM, COPD, or hypertension with improved monitoring, rehabilitation, and interventions. For patients suffering from T2DM, advanced telemedical treatments, such as telemonitoring, focus on regular monitoring of the blood glucose levels, body weight, BP, and quality of life. Similarly, patients suffering from COPD utilize telerehabilitation in order to improve exercise volume and quality of life. Furthermore, efficient telemedical treatments for hypertension involve BP monitoring and lifestyle changes. Through these various telemedical treatments, we can improve and maintain the outcomes of certain physical disorders in order to reduce risk of complications in the future. Although telemedicine provides several benefits, it presents various limitations which have to be addressed in order for patients to receive efficient care. Individuals with low income backgrounds or those living in underserved areas are not able to access the required technology such as a phone or computer in order to engage in these virtual sessions increasing the digital divide in healthcare access. The “digital divide” is the civil division between individuals that have access to technology and individuals who face barriers with access to technological devices. Reliant internet and technology devices are needed to successfully participate in telemedical visits and consultations. With the increase of telemedical approaches using technology-based tools, the digital divide will continue to increase existing health care access disparities ([Alkureishi et. al., 2021](#)). In order for patients to receive better access to telemedical treatments, healthcare providers could enforce an initiative to increase internet access to underserved or low income areas. In conclusion, telemedicine is a revolutionary tool that will continue to improve and enhance access to care for individuals with mental health and physical disorders.

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