

Telemedicine and eHealth Solutions in Clinical Practice

Fabrizio Del Carpio-Delgado^{1,*}, David Hugo Bernedo-Moreira², Antony Paul Espiritu-Martinez³, José Luis Aguilar-Cruzado¹, Carlos Eduardo Joo-García¹, Marilí Ruth Mamani-Laura¹, Rafael Romero-Carazas¹

¹Universidad Nacional de Moquegua, Moquegua, Perú

²Universidad César Vallejo, Lima, Perú

³Universidad Nacional Autónoma Altoandina de Tarma, Junín, Perú

Abstract

Introduction: Over the past decade, telemedicine and mobile health have experienced significant growth, becoming essential tools for healthcare in an increasingly digitized world. This research focuses on exploring how these technologies have improved the accessibility, efficiency and quality of healthcare, despite challenges related to data security and equity of access, with the aim of understanding their impact and potential in modern healthcare.

Methods: a PubMed search was performed using the keywords "Telemedicine" and "mHealth" to find relevant studies on its application in clinical practice, with inclusion criteria covering articles in Spanish and English published between 2018 and 2023, freely available. The PRISMA workflow was followed to review and synthesize key findings and trends in this field.

Result: the contribution of countries such as China, Australia and the United States in telemedicine and mobile health, with a focus on cardiovascular diseases and metabolic disorders, is highlighted. The positive impact on chronic diseases, mental health, physical activity and treatment adherence is highlighted, but the need to adapt interventions and lack of COVID-19 studies is emphasized.

Conclusions: Telemedicine addresses a variety of pathologies, focusing on chronic diseases, with China leading in contributions. eHealth seeks to improve health outcomes and reduce the burden of disease.

Keywords: Telemedicine, mHealth, Mobile Health, Pervasive Health.

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1. INTRODUCTION

In the last decade and more recently, in the wake of the coronavirus pandemic, telemedicine and mobile health have experienced significant growth and radical transformation¹. In an increasingly interconnected, digitized and technology-dependent world, medicine is bursting to make use of these advances^{2 3 4 5}. Today they have become essential tools for healthcare delivery and health management in contemporary society^{6 7 8 9}.

Telemedicine is a modality of medical care that involves the use of electronic communication technologies to enable the evaluation, diagnosis, treatment and follow-up of patients at a distance^{10 11}. In other words, it involves the delivery of health care services without physicians and patients necessarily being in the same physical location. Telemedicine uses a variety of tools, such as videoconferencing, mobile applications, online medical data exchange and remote monitoring devices, to facilitate interaction between healthcare professionals and patients, providing access to medical care in remote locations or in situations where face-to-face consultation is not possible^{12 13}.

*Corresponding author. Email: fdelcarpiod@unam.edu.pe

It can be said that twenty years ago medical care was rooted in the model of face-to-face consultation in hospitals and doctors' offices^{14 15}. However, with the evolution of information and communications technology, telemedicine has emerged as an innovative approach that allows patients and healthcare professionals to connect through electronic means, social networks and other virtual environment¹⁶, with its pro and cons^{17 18 19 20 21 22}. This has revolutionized the way healthcare is delivered by making it more accessible and convenient, although there are many gaps still^{23 24 25}. Now, people can consult their doctors, receive diagnoses and treatments, and even manage their chronic illnesses from the comfort of their homes using electronic devices, such as computers, smartphones and tablets^{26 27}. Simultaneously, mobile health or eHealth has gained importance as mobile devices have become ubiquitous in everyday life. Health apps, health tracking devices and wearable medical sensors allow individuals to monitor their well-being continuously and take preventative measures to stay healthy. In addition, these technologies also allow physicians to access real-time information about their patients, facilitating more informed medical and administrative or educational decision-making^{28 29 30 31}. Mobile health, or eHealth, refers to the use of mobile devices, such as smartphones and tablets, along with specific software applications, to provide healthcare services, health monitoring and wellness promotion³². This technology enables individuals to access health information, track their biomedical data, receive reminders and health tips, and communicate with healthcare professionals through applications designed for these purposes. In addition, eHealth can also involve wearable devices, such as smartwatches and health sensors, which collect vital data and transmit it to mobile applications for analysis and continuous monitoring³³. In a world where geographic distance is no longer an insurmountable barrier and where medical information is within reach, telemedicine and mobile health are transforming medical care by making it more efficient, accessible and personalized^{34 35}. These technologies have not only revolutionized the relationship between physicians and patients, but have also opened up new possibilities in the management of public health, the care of remote populations and the improvement of the quality of life of people around the world³⁶. In this context, it is essential to explore in detail the key aspects of telemedicine and mobile health to understand their impact and potential in the field of modern healthcare^{37 38}.

Despite the obvious benefits such as remote care, cost reduction and convenience and flexibility, this modality of care presents challenges such as safeguarding and securing patients' clinical data, achieving equity in access, among others. It is important to address these challenges in order to maximize the benefits of telemedicine and mobile health, while ensuring the quality and safety of medical care provided through these technologies. The central objective of this research focuses on exploring the validated uses and effective applications of telemedicine and mobile health solutions in the clinical practice setting. It seeks to comprehensively understand how these technologies have evolved to contribute significantly to improved medical care and patient outcomes. To this end, we will investigate how these technological tools have impacted the accessibility of medical services, optimized the efficiency of care, and elevated the quality of medical care provided in today's healthcare context.

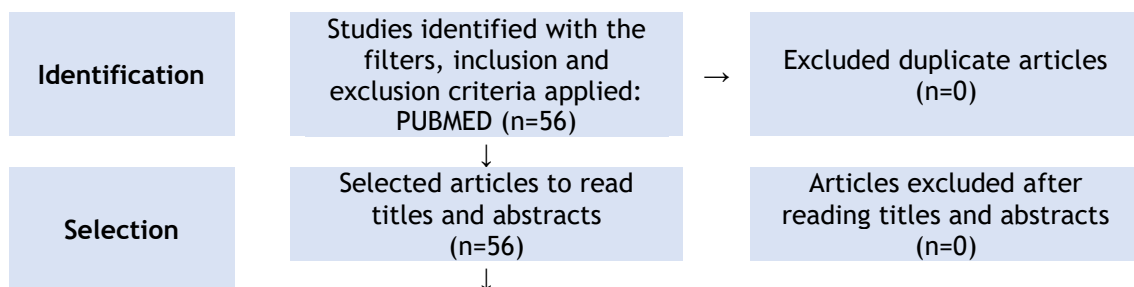
2. METHOD

To carry out the literature search related to telemedicine and eHealth solutions used in clinical practice, a search was performed in PubMed. The keywords used in this search were "Telemedicine" and "mHealth". The search term used was: Telemedicine AND "mHealth". This methodology was designed similar to previous studies regarding comparable objectives^{39 40 41 42 43}.

To ensure the selection of relevant studies, both inclusion and exclusion criteria were established. Studies should focus on the application of telemedicine and mobile health solutions in clinical practice. Meta-analysis articles in Spanish and English between 2018 and 2023 were taken. Studies had to be openly and freely available.

Titles and abstracts of articles identified in the initial search will be reviewed to determine their relevance to the article topic. Articles that meet the inclusion criteria will be reviewed in their entirety to extract relevant information about the application of telemedicine and mobile health solutions in clinical practice, as well as the associated benefits and challenges. An analysis and synthesis of the results of the selected articles will be conducted, highlighting key findings and trends in the implementation of telemedicine and mobile health in clinical practice.

The review was carried out following the PRISMA workflow detailed in Figure 1 detailed in figure 1⁴⁴.



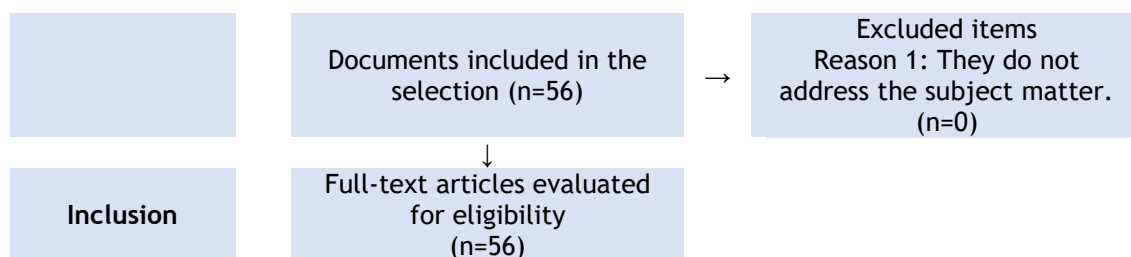


Figure 1. Flowchart of the state-of-the-art review according to PRISMA methodology.

3. RESULTS

Technological advances have radically transformed the way healthcare is delivered around the world. They have

emerged as powerful tools that have revolutionized clinical practice. In this context, this research embarked on a comprehensive analysis of the scientific literature to explore the applications and impacts of these technologies on current medical care.

Table 1. Explanatory matrix of the included articles.

N	Author, country, year	Target	Main Results
1 ⁴⁵	Ruco, Canada, 2021	Randomized controlled trials and quasi-experimental studies of social networks and mobile health interventions that promote cancer screening in adults.	Thirty-nine records were identified (35 eHealth and 4 social networks). Types of interventions included peer support (n=1), education or awareness (n=6), reminders (n=13), or mixed (n=19). The overall pooled odds ratio was 1.49 (95% CI 1.31-1.70), with similar effect sizes across all cancer types.
2 ⁴⁶	Chen, China, 2020	Randomized controlled trials and cohort studies to evaluate the efficacy and safety of telemedicine in the treatment of chronic wounds.	Efficacy results in randomized controlled trials showed no significant difference in wound healing, nor in wound healing at around 1 year. A decreased risk of amputation was revealed in patients who received telemedicine (p = 0.001). The result of the cohort studies showed that telemedicine was more effective than standard care (p < 0.001), while the efficacy of wound healing outcomes around 1 year and 3 months was not significantly different between telemedicine and standard care.
3 ⁴⁷	Lv, China, 2021	Randomized controlled trials related to telemedicine and eHealth interventions in the control of systolic blood pressure among stroke survivors.	Compared to usual care, telemedicine and mobile health had a significantly greater impact on systolic blood pressure control (p<0.001). A subgroup analysis showed that the intervention mode of phone plus SMS text messaging (p < 0.001) or phone only (p<0.001); had a greater impact on systolic blood pressure control than usual care. Among stroke survivors with an intervention interval ≤1 week or baseline systolic blood pressure ≥140 mm Hg, systolic blood pressure control using telemedicine and eHealth was better than usual care
4 ⁴⁸	Odendaal, South Africa, 2020	Studies that used qualitative data collection and analysis methods on eHealth programs. The aim was to synthesize evidence on the perceptions and experiences of health workers on the use of mobile health technologies.	Of note, the mobile devices were loaded with decision support software. Other uses included communicating in person and/or via text messaging, and recording client health information. Improved flexible working. Health workers felt that communicating with clients by cell phone improved care and their relationships with clients, but felt that some clients needed face-to-face contact.
5 ⁴⁹	Cruz-Cobo, Spain, 2022	Systematic review of randomized clinical trials involving an intervention consisting of an eHealth program using a mobile application in patients after a coronary event.	Improvements and adherence in terms of 6-minute walks and adherence to treatment were achieved in the groups using eHealth (p < 0.001). In addition, the physical and mental dimensions of quality of life were better in the eHealth group (p = 0.01). All-cause and cardiovascular

			hospital readmissions were statistically higher in the control group than in the eHealth group ($p = 0.05$).
6 ⁵⁰	Eberle, Germany, 2021	Systematic review to determine the impact of diabetes mellitus-specific eHealth applications on glycosylated hemoglobin management.	Overall, there was a clear improvement in glycosylated hemoglobin values. In addition, positive trends toward better self-care and self-efficacy were found as a result of using the eHealth application.
7 ⁵¹	Zhao, China, 2021	Review of randomized controlled trials to evaluate the effectiveness of telehealth interventions to reduce depressive symptoms and anxiety in women with postpartum depression.	Edinburgh Postnatal Depression Scale ($p < 0.001$) and anxiety ($p = 0.005$) scores were significantly lower in the telehealth group compared to the control group. Significant differences were found between subgroups in depressive symptoms according to severity of depression, telehealth technology, specific therapy and follow-up time ($p < 0.001$).
8 ⁵²	Li, China, 2020	Systematic review with the objective of measuring the effectiveness of eHealth in improving self-management of hypertension in adults.	A greater reduction in both SBP and DBP was observed in the eHealth intervention groups compared with the control groups ($p < 0.001$; $p < 0.001$). Sixteen studies reported improved medication adherence and behavioral changes in the intervention groups, while 8 showed no significant changes.
9 ⁵³	Robson, Australia, 2021	Systematic review of randomized controlled trials that evaluated the effect of one or more types of telehealth interventions on glycosylated hemoglobin levels compared to usual care alone.	Telehealth interventions were shown to have a stronger influence on HbA1c compared to usual care ($p = 0.04$). Telehealth interventions, when grouped by type of tele-monitoring (mobile health and telephone communication), had a stronger effect on reducing HbA1c levels; however, none of these findings were significant.
10 ⁵⁴	Brickwood, Australia, 2019	Systematic review of articles involving the use of a wearable activity tracker.	There was a significant increase in daily step count ($p < 0.001$), moderate and vigorous physical activity ($p < 0.001$), and energy expenditure ($p = 0.03$) and a non-significant decrease in sedentary behavior ($p = 0.08$).
11 ⁵⁵	Baumann, Germany, 2022	Review of randomized controlled trials involving eHealth interventions for primary prevention in children and adolescents of physical inactivity and sedentary lifestyles.	It showed that studies with high levels of individualization significantly decreased insufficient levels of physical activity ($p = 0.01$), while those with low levels of individualization did not show significant results ($p = 0.08$).
12 ⁵⁶	Moreno-Ligero, Spain, 2023	Review of articles on the use of eHealth systems on gait and dynamic balance outcomes in subjects with neurological disorders.	A total of 21 mobile applications were identified to train gait and balance, and to improve physical activity behaviors. The findings suggested the use of eHealth systems to improve gait in subjects with neurological disorders, but controversial results were obtained on the recovery of dynamic balance. However, the quality of evidence is insufficient to strongly recommend them, so more research is needed.
13 ⁵⁷	Jung, Republic of Korea, 2022	Review of randomized controlled trials seeking to improve physical activity through eHealth interventions.	The studies were able to improve physical activity but no significant differences in weight loss were observed when comparing the intervention group with the control groups ($p = 0.48$).
14 ⁵⁸	Butler, Australia, 2022	Systematic review with the objective of identifying eHealth and mHealth interventions in children and young people with juvenile idiopathic arthritis.	The interventions were based on applications or websites that allow the monitoring of pain and patient satisfaction with the pediatric consultation. These results were not statistically significant and the sample of studies should be increased.
15 ⁵⁹	Jeminiwa, USA, 2019	Systematic review on the efficacy of eHealth in improving adherence to inhaled corticosteroids in patients with bronchial asthma.	The included trials used: social networking ($n=1$), electronic medical records ($n=1$), telehealth ($n=6$) and eHealth ($n=7$). The results show a small but significant overall effect of eHealth interventions. A significant improvement in adherence was observed for mHealth interventions compared to usual care.

16 ⁶⁰	Indraratna, Australia, 2020	Meta-analysis study of randomized controlled trials presenting a cell phone intervention used in the treatment of chronic cardiovascular disease.	Of note, in patients with heart failure, cell phone interventions were associated with a significantly lower rate of hospitalizations (OR 0.77, $p = 0.03$). In patients with hypertension, patients had a significantly lower SBP ($p = 0.02$).
17 ⁶¹	Qian, China, 2021	Systematic review on the analysis of eHealth-based interventions that can improve breastfeeding status.	The eHealth-based interventions significantly increased the rate of postpartum exclusive breastfeeding (OR 3.18; $p < 0.001$), improved breastfeeding self-efficacy ($p < 0.002$), reduced infant health problems (OR 0.62; $p = 0.01$).
18 ⁶²	Valentijn, The Netherlands, 2022	Study with the objective of determining the effectiveness of digital health interventions for people with musculoskeletal pain conditions.	In moderate-quality evidence, digital health interventions had a small effect on pain, disability, quality of life, emotional functioning, and self-care.
19 ⁶³	Mönninghoff, Switzerland, 2021	Review on the immediate and long-term effects of eHealth interventions on physical activity.	The eHealth interventions significantly increased physical activity (walking $p < 0.001$; moderate to vigorous physical activity $p < 0.001$; total physical activity $p < 0.001$; energy expenditure $p = 0.01$).
20 ⁶⁴	Rahman, Japan, 2022	Review of randomized controlled trials of eHealth interventions in improving the uptake of antenatal, prenatal, and postnatal care visits in low- and middle-income countries.	A positive effect of eHealth interventions on improving the number of antenatal care visits was shown. Only bidirectional eHealth interventions were effective in improving the use of skilled attendance during delivery, but the effects were not clear compared to standard care. For hospital delivery, interventions were effective in settings where fewer pregnant women were not using it.
21 ⁶⁵	Nunes-Queiroz, Brazil, 2021	Systematic review analyzing mobile applications addressing post-exposure prophylaxis for HIV infections. Apps were identified from two main libraries: Google Play Store and App Store.	Two studies on the use of apps as eHealth strategies aimed at improving the sexual health of men who have sex with men were analyzed and categorized as decision support systems. In the app libraries, 25 apps were found and analyzed, of which 15 (60%) were available for Android systems, but only 3 (12%) addressed post-exposure prophylaxis and were created by researchers from Brazilian universities.
22 ⁶⁶	Uthman, United Kingdom, 2019	Review of randomized controlled trials on efficacy of eHealth versus face-to-face interventions for patients living with HIV with smoking.	Interventions delivered via eHealth were significantly more effective in increasing smoking cessation than non-intervention control and face-to-face interventions. In the short term, face-to-face interventions were no more effective than no intervention in increasing smoking cessation. In terms of achieving long-term outcomes among people living with HIV, there were no significant differences in smoking cessation rates among those who received eHealth interventions, face-to-face interventions, or no intervention.
23 ⁶⁷	Gayesa, China, 2023	Systematic review to evaluate the effectiveness of mobile health interventions in improving institutional delivery, awareness of obstetric danger signs, and exclusive breastfeeding.	The study showed that the eHealth intervention has a significant positive effect on improving institutional delivery (OR = 2.21), utilization of postnatal care (OR = 4.13), and exclusive breastfeeding (OR = 2.25). The intervention has also demonstrated a positive effect on increasing awareness of obstetric danger signs.
24 ⁶⁸	Mao, China, 2020	Systematic review and meta-analysis to assess the impact of mobile health in countries with different levels of economic development.	There is evidence that eHealth intervention can play an important role in improving clinical outcomes compared to conventional care, as well as having a positive impact in countries with different levels of economic development. Combining eHealth with human intelligence rather than exclusively using eHealth intervention can improve health indicators.

25 ⁶⁹	Lee, Singapore, 2023	Systematic search to assess eHealth in the management of type 2 diabetes mellitus in the elderly population.	The results showed significant benefits in glycosylated hemoglobin ($p = 0.01$), postprandial blood glucose ($p = 0.002$) and triglycerides ($p = 0.010$), but not in low-density lipoprotein cholesterol ($p = 0.170$), high-density lipoprotein cholesterol ($p = 0.220$) and systolic and diastolic blood pressure ($p = 0.670$; $p = 0.090$).
26 ⁷⁰	Zulu, United Kingdom, 2020	Systematic literature search on the evidence of eHealth and its efficacy in increasing contraceptive use.	A pooled estimate of all studies showed a positive association between telephone messages and contraceptive use, but no clear evidence of benefit (OR 1.12).
27 ⁷¹	Kim, Republic of Korea, 2021	Systematic search to evaluate the effect of eHealth-based exercise interventions on walking performance, functional status, and quality of life in patients with peripheral artery disease.	In the pooled analysis, compared with the control groups, the eHealth-based exercise intervention groups were associated with significant improvements in pain-free walking, the 6-minute walk test, and distance walked. However, no benefits of the interventions on walking speed, stair climbing ability, and quality of life were observed.
28 ⁷²	Buneviciene, Lithuania, 2021	Review on eHealth and its use for interventions to optimize quality of life.	The most commonly studied eHealth interventions included physical activity/fitness interventions ($n=6$), cognitive behavioral therapy ($n=6$), mindfulness/stress management ($n=3$). In most studies, eHealth interventions were associated with improved quality of life for cancer patients.
29 ⁷³	Fang, china, 2023	Systematic review and meta-analysis aiming to summarize recent evidence from randomized controlled trials on the effectiveness of eHealth-based smoking interventions.	App texting can significantly increase abstinence in both the short term (3 months) and long term (6 months). Text message frequency did not significantly influence treatment outcomes. Studies without personalized or interactive features did not have a significant impact.
30 ⁷⁴	Cavero-Redondo, Spain, 2020	Systematic review to identify the effect of behavioral weight management interventions using eHealth lifestyle self-monitoring on weight loss and adherence.	The study yielded a moderate decrease in weight and increased adherence to the intervention of behavioral weight management interventions using eHealth lifestyle self-monitoring, which was higher than other interventions.
31 ⁷⁵	Chen, China, 2021	Systematic review on the efficacy of eHealth interventions in patients with low back pain compared to usual care.	Simultaneous use of eHealth and usual care showed better reduction in pain intensity than usual care alone ($p < 0.001$) and greater efficacy in reducing disability ($p < 0.001$). Compared with usual care, consultations via telephone calls significantly reduced pain intensity ($p < 0.001$). However, without the use of telephone calls had no obvious advantage over usual care in improving pain intensity ($p = 0.16$).
32 ⁷⁶	El-Gayar, USA, 2021	The review seeks to examine specific behavior change theories and techniques used in the design of mobile application-based self-care interventions aimed at achieving glycemic control.	The findings show that eHealth applications produced statistically significant clinical outcomes compared to standard care for glycemic control ($p < 0.0001$), indicating that such interventions result in a reduction of HbA1c.
33 ⁷⁷	Wang, China, 2022	Systematic review to evaluate the effectiveness of oral health education using the eHealth approach for parents to improve their children's oral health.	All included studies were at high risk of bias. There was low/very low certainty evidence that the eHealth approach could improve parental knowledge about oral health.
34 ⁷⁸	Robert, Singapore, 2021	Systematic review and meta-analysis on the effectiveness of eHealth applications in delivering nutritional interventions for middle-aged and older adults.	The most commonly used type of eHealth intervention was mobile apps (22/70, 31%). Most studies (62/70, 89%) provided multicomponent health interventions aimed at improving nutrition and other health behaviors (e.g., exercise, smoking cessation, medication adherence). The results of the meta-analysis indicated high and

			significant heterogeneity; therefore, conclusions based on these results should be viewed with caution. Nevertheless, the results generally showed that eHealth interventions improved anthropometric and clinical outcomes, but not behavioral outcomes such as fruit and vegetable consumption.
35 ⁷⁹	Sun, China, 2023	Meta-analysis study that aims to analyze the efficacy of eHealth on adherence to antiretroviral therapy in patients living with HIV.	There is evidence that eHealth interventions help treatment adherence, but the result was not statistically significant (OR 1.54; p = 0.05). In the subgroups, only short messaging service (SMS)-based interventions significantly increased treatment adherence (OR 1.76; p = 0.03). Further analysis showed that only interactive or bidirectional SMS could significantly increase adherence (OR 1.69; p = 0.001).
36 ⁸⁰	Wei, China, 2023	Systematic review to evaluate the effectiveness of eHealth intervention in pregnant women with gestational diabetes mellitus.	The results showed a significant improvement in glycemic control. In addition, eHealth interventions could reduce the occurrence of adverse pregnancy outcomes and improve self-care capacity. WeChat application was used as a communication channel.
37 ⁸¹	Seppen, The Netherlands, 2020	Systematic review to evaluate eHealth interventions for patients with rheumatoid arthritis.	In the 10 selected studies, 4 different types of eHealth interventions were used: SMS reminders (to increase medication adherence or physical activity; n=3), web apps (for disease tracking and/or to provide medical information; n=5), smartphone apps (for disease tracking; n=1) and pedometers (to increase and track steps; n=1). Outcomes measured varied widely across studies; improvements were observed in terms of medication adherence (SMS reminders), achieving rapid remission (web app), various physical activity domains (pedometer, SMS reminders, and web apps), doctor-patient interaction (web apps), and self-efficacy. (smartphone app).
38 ⁸²	Inal, Norway, 2020	Study reviewing the literature on how usability is addressed and measured in mHealth interventions for mental health problems.	Most studies evaluated usability with patients (n=29) and health care providers (n=11) compared to healthy users (n=8) and targeted a wide variety of mental health problems (n=24). Half of the studies aimed to assess usability (n=21) and the remainder focused on feasibility (n=10) or acceptability (n=10). The most common reason cited for developing mobile mental health apps was the availability of mobile devices to users, their popularity, and how people in general became accustomed to using them for various purposes.
39 ⁸³	Binyamin, Saudi Arabia, 2021	Meta-analysis study aimed at identifying factors that may affect the acceptance of eHealth.	The study concludes that the key points for acceptance are perceived usefulness, perceived ease of use, attitude towards the behavior, subjective norms and facilitating conditions.
40 ⁸⁴	Fowler, USA, 2021	Review examining the efficacy of recent technology-based interventions on childhood obesity outcomes.	Thirty studies relied mostly or solely on technology for intervention delivery. Meta-analyses of the 20 included prevention clinical trials showed no significant effect of prevention interventions on obesity outcomes.
41 ⁸⁵	Zhang, China, 2022	Systematic review identifying evidence on the efficacy of mobile health technology in inducing physical activity and reducing sedentary behavior in physically inactive individuals.	On the topic we found two interventions delivered solely through a mobile application (stand-alone intervention) and seven studies included interventions that used applications and other intervention strategies (multicomponent intervention). The mobile health intervention improved physical activity and reduced sedentary behavior among inactive people.
42 ⁸⁶	Yang, USA, 2019	Systematic review to evaluate the overall effect of eHealth	The results (n=64) showed that eHealth interventions are relatively more effective than the comparison

		interventions compared with alternative interventions or conditions.	interventions or conditions, with a small but significant overall weighted effect size (Cohen $d=0.31$).
43 ⁸⁷	Zhou, China, 2023	Systematic review to determine whether eHealth effectively improves the control rate of uncontrolled hypertension.	Thirteen clinical trials were included, of which 8 reported the rate of successful control, 13 reported the change in systolic blood pressure, and 11 reported the change in diastolic blood pressure. The duration of follow-up ranged from 3 to 18 months. This study showed a stronger effect size for improving the rate of blood pressure control by eHealth interventions than usual care (OR 2.19).
44 ⁸⁸	Von Stecher, Germany, 2023	The meta-analysis study aimed to describe recent eHealth interventions to promote physical activity	The main outcome of app- or device-based physical activity differed between interventions: the majority of interventions (17/22, 77%) used activity monitors or physical activity trackers, while the remainder (5/22, 23%) used app-based accelerometry measures. We identify that the duration of the study seems to be unrelated to the size of the effect caused.
45 ⁸⁹	Rebolledo, Colombia, 2023	The systematic review evaluates mobile telemonitoring strategies in patients with heart failure	The risk of bias for mortality and hospitalization was mostly low, whereas for quality of life it was high. A reduction in the risk of hospitalization for heart failure was observed with the use of mobile telemonitoring strategies (RR 0.77). A non-statistically significant reduction in the risk of mortality was observed. The impact on quality of life was variable between studies.
46 ⁹⁰	Meyerowitz-Katz, Australia, 2020	The meta-analysis study evaluated dropout rates in chronic disease applications and synthesized possible reasons.	The combined dropout rate was 43% and observational studies had a higher dropout rate (49%). In more controlled settings, which only had a dropout rate of 40%. In relation to the causes of dropout, social demographic factors were identified.
47 ⁹¹	Hyzy, United Kingdom, 2022	Systematic review to evaluate the use of the System Usability Scale (SUS) in digital health applications.	The mean SUS score when all collected apps were included was 76.64 (SD 15.12); however, this distribution showed skewness and was not normally distributed according to the Shapiro-Wilk test ($P = 0.002$). The mean SUS score for the "physical activity" applications was 83.28 (SD 12.39) and drove skewness. Thus, the mean SUS score for all collected apps, excluding physical activity apps, was 68.05 (SD 14.05). A total of 117 SUS scores were identified for 114 digital health apps.
48 ⁹²	El Bizri, Canada, 2021	Systematic review evaluating the effectiveness of eHealth technologies supporting colonoscopy preparation.	The eHealth interventions included smartphone apps, SMS text messages, videos, camera apps, and a social networking app. Outcomes were bowel cleansing quality, user satisfaction, colonoscopy quality indicators (cecal intubation time, withdrawal time, adenoma detection rate), dietary adherence, and cancellation/absence rates. The eHealth interventions were associated with improved bowel cleansing scores, but were not associated with rates of willingness to repeat colonoscopy using the same regimen.
49 ⁹³	Calegari, Brazil, 2023	The systematic review assessed user perceptions of the acceptability of eHealth technologies.	The study concludes that there is good user acceptance of mobile health systems.
50 ⁹⁴	Tucker, USA, 2021	The meta-analysis study looks at eHealth interventions from apps in the Apple and Google Play stores in the categories of health/fitness, medical or education in postpartum maternal patients.	The study highlights that the coverage of maternal health information was positively correlated with the usability score of the apps analyzed. There was no correlation between the usability score and the number of app users, as estimated by the number of app ratings available in the app store. In addition, apps with evidence-based maternal

			health information had higher engagement, information, and aesthetics scores. However, the presence of evidence-based information did not correlate with a higher number of app users.
51 ₉₅	Elepaño, Philippines, 2020	The systematic review and meta-analysis aimed to determine the effectiveness of different eHealth interventions in increasing colorectal cancer screening rates.	The study showed low clinical and statistical heterogeneity. Overall, the use of eHealth interventions is associated with higher uptake of colorectal cancer screening compared with usual care. This effect was observed across different types of eHealth interventions, including automated and non-automated telephone education and text message reminders.
52 ₉₆	Wang, China, 2019	A systematic review was conducted to evaluate the use of eHealth in diabetes mellitus care and reported glycosylated hemoglobin values as a measure of glycemic control.	This study showed a statistically significant decrease in mean glycosylated hemoglobin in the intervention group.
53 ₉₇	Gashu, Ethiopia, 2020	Randomized controlled trials of eHealth interventions in patients diagnosed with tuberculosis were included in the review.	The study finds that the combined effect of cell phone messaging increases treatment success compared to standard care.
54 ₉₈	Sin, United Kingdom, 2020	The systematic review aimed to analyze fully web-based interventions for people with common mental disorders.	All interventions offered algorithm-based screening with measures to assess symptom levels and assign treatment options, including automated web-based psychoeducation, self-care strategies, and signposting to existing services. The study showed that digital interventions improved well-being, mental illness symptoms, and occupational and social functioning. However, some follow-up data failed to show any sustained effect beyond the post-intervention time point.
55 ₉₉	Xu, China, 2021	The review included randomized controlled trials on the effect of eHealth on alleviating risk factors for the onset and development of coronary heart disease.	The results showed that mobile health can reduce body mass index ($p < 0.05$), waist circumference ($p < 0.00001$), total cholesterol level ($p < 0.00001$), low-density lipoprotein cholesterol level ($p < 0.05$), diastolic blood pressure ($p < 0.05$) and depression ($p < 0.05$) and increase high-density lipoprotein cholesterol level ($p < 0.05$) with statistically significant differences. eHealth can alleviate coronary heart disease risk factors and has some effect on the prevention and recovery from coronary heart disease.
56 ₁₀₀	Zhong, China, 2023	This systematic review and meta-analysis aimed to evaluate the long-term effectiveness of cardiac telerehabilitation.	The results showed that after cardiac telerehabilitation, there was a significant difference in the improvement in long-term maximal oxygen consumption compared with cardiac rehabilitation in a center ($p = 0.01$), particularly after 6 months of rehabilitation training ($p = 0.02$). There was no significant difference in the reduction of cardiovascular risk factor control. There was also no practical demonstration of anxiety or depression scores. However, cardiac telerehabilitation demonstrated an improvement in patients' long-term quality of life ($p = 0.04$). In addition, the study reported a high completion rate (80%) of the interventions. The incidence of adverse events was also low during long-term follow-up.

Legend: OR odds ratio, SBP systolic blood pressure, DBP diastolic blood pressure, RR relative risk, SD standard deviation.

4. DISCUSSION

The countries that contribute most to the subject are China with ten studies, Australia and the United States with five each, and then Germany, Spain and the United Kingdom with three each. The fact that China has a large

number of telehealth studies may be due to several reasons: population size, technological advances and health policies, growing investment in research and the high level of international collaboration¹⁰¹.

On the other hand, the most studied pathologies were cancer with four studies, cardiovascular disorders with seven studies, metabolic disorders and associated risk factors with six studies, and mental disorders with four studies.

The reason why certain pathologies were more studied may be due to: the high prevalence of these diseases, their severity and high degree of disability to the patient and the need for continuous care. Also, a more profound look to the relation between rehabilitation, psychological factors, workplace professional relationships and telemedicine^{102 103 104 105}.

The results of this scientific review provide strong evidence that eHealth interventions have a positive impact on a wide variety of health and wellness areas^{45 46 47}. These findings support the growing adoption of eHealth as a valuable tool in health care and health promotion.

In the field of chronic disease management, several studies highlight the usefulness of eHealth. Improvements were observed in the control of systolic blood pressure in stroke survivors and in the management of diabetes mellitus, including a significant reduction in glycosylated hemoglobin levels^{46 47 50}.

These results indicate that eHealth can play a crucial role in self-care and chronic disease monitoring, which can improve patients' quality of life and reduce associated risks.

The mobile health practice was shown to be effective in mental health management, with significant reductions in depressive and anxiety symptoms in women with postpartum depression⁵¹. Linked to this was demonstrated utility in areas such as breastfeeding, physical activity and weight management, where improvements in breastfeeding rate, physical activity and weight loss were observed⁶¹.

Physical activity promotion has also benefited from eHealth interventions; they have shown that mobile health interventions can increase physical activity in inactive individuals. This finding is particularly relevant at a time when physical inactivity has become a global health problem. App- and device-based interventions have been shown to be effective in motivating people to be active and lead healthier lifestyles^{106 107 108}.

Disease-specific disease management has also been an important focus of eHealth, especially those based on interactive short messaging services (SMS), can significantly improve treatment adherence in patients, such as those living with HIV. This is crucial to ensure that these patients receive appropriate care and maintain consistent treatment^{65 66 79}.

In addition, usability and acceptability of eHealth technologies are key factors affecting their effectiveness. Binyamin and Inal's studies highlight the importance of eHealth interventions being perceived as useful and easy to use by users, which can influence their adoption and success^{82 83}.

It is curious that during the period worked (2018-2023) no meta-analysis studies on clinical trials working Covid-19 disease were found. Everything seems to indicate that it is still early to draw conclusions on the use of technology in the care of this type of patients during the pandemic contingency of 2020 and 2021.

eHealth is proving to be a valuable tool in the transformation of healthcare. From chronic disease management to promoting physical activity and improving treatment adherence, interventions are having a significant impact on the way health care is delivered around the world. However, it is important to recognize that the heterogeneity in outcomes and approaches highlights the need for careful and personalized evaluation of eHealth interventions in different healthcare settings. The future of healthcare will surely continue to see exciting developments in this evolving area.

5. CONCLUSIONS

Telemedicine studies are notable for addressing a wide variety of pathologies and medical conditions, from cancer to cardiovascular disease, metabolic disorders and mental disorders. This highlights the versatility of telehealth as a valuable approach to improving medical care in diverse areas of health.

There is a strong emphasis on chronic diseases in these studies. Many of the targets focus on conditions that require long-term management and continuous follow-up. This is presented as an effective solution for monitoring and treating these conditions, which can have a positive impact on patients' quality of life.

It should be noted that China is the leading contributor in this area, and that the most studied pathologies include cancer, cardiovascular diseases, metabolic disorders and mental disorders, possibly due to their high prevalence, severity and need for ongoing care.

A common theme in these studies is the focus on improving health outcomes. Whether it is through chronic disease management, promoting healthy lifestyle habits or facilitating access to care, eHealth is presented as an effective tool in the pursuit of positive health outcomes and reducing the burden of disease.

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