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TELEMEDICINE AND MONITORING DEVICES AS TOOLS FOR IMPROVING THE QUALITY OF LIFE OF OLDER ADULTS

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ABSTRACT

Research objectives: The aim of the study was to gather current evidence on the impact of telemedicine and remote monitoring technologies on quality of life and clinical outcomes in older adults. It also aimed to identify the public health implications of such interventions.

Methods: A structured narrative review of peer-reviewed articles published in English between 2016 and 2025 was conducted. These were identified through searches in PubMed, Web of Science, Scopus, and Google Scholar using keywords related to telemedicine, telecare, remote monitoring, wearable devices, older adults, and quality of life. Quantitative, qualitative, and review studies involving patients aged 60 years and older with cardiovascular and respiratory diseases, diabetes, neurological and psychiatric disorders, frailty syndrome, rehabilitation needs, and in the postoperative period were included.

Key findings: The included studies indicated that telemedicine contributed to improvements in quality of life and in physical and mental health status, and it also had a positive impact on increasing the level of self-care. These interventions favorably affected clinical parameters such as blood pressure control and glycemic control, which was particularly important in patients with multimorbidity. In many geriatric populations, a reduction in the number of hospitalizations and healthcare costs was also observed.

Conclusions: Telemedicine and remote monitoring devices are promising tools supporting aging in place and reducing the burden on the public healthcare system in the context of population aging. Full and effective use of teleinterventions still requires adaptation of the technology to fit the functional and cognitive abilities of older patients.

KEYWORDS

Telemedicine, Remote Patient Monitoring, Wearable Devices, Older Adults/elderly, Quality Of Life

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1. Introduction

By 2050, the number of people aged over 60 is expected to reach 21% of the population, that is, as many as 2.1 billion individuals. This has led to one of the greatest demographic shifts of the 21st century: population aging. As a result, public health care systems worldwide have faced a major challenge. Older adults have become a large population group, much more frequently burdened by chronic diseases, multimorbidity, and geriatric syndromes. This has increased the need for long-term care and raised the costs of caring for such individuals [1]. Attention should also be paid to issues such as a lack of family support, insufficient financial resources and limited access to health care services, alongside a reduced ability to function independently. However, most older adults would not want to leave their place of residence and would prefer to age there [2].

Such a situation required the search for and implementation of new models of care for older adults, including the use of digital technologies. The aim of this article was to review current evidence on the impact of telemedicine and remote monitoring devices on the quality of life and health status of older adults, and to discuss the implications of these solutions for public health.

2. Methodology

This article took the form of a structured narrative review, aiming to synthesize current evidence on the impact of telemedicine and remote health monitoring devices on the quality of life and health status of older adults. The use of a narrative review format made it possible to include both quantitative studies (e.g. randomized clinical trials and observational studies) and qualitative studies as well as systematic reviews, thereby capturing the broad, interdisciplinary context of the phenomenon.

The primary data source was the PubMed database, supplemented by Web of Science, Scopus, and Google Scholar. The literature search covered the period from 2016 to 2025 and included only articles published in English

in peer-reviewed scientific journals. The search strategy combined MeSH terms and free-text expressions referring to telemedicine, remote monitoring, wearable devices, older adults, and quality of life.

An example search query was as follows:

("telemedicine" OR "telehealth" OR "telemonitoring" OR "remote patient monitoring") AND ("older adults" OR elderly OR "aged 65 and over") AND ("quality of life" OR "health-related quality of life") and ("wearable devices" OR "wearables" OR "remote health monitoring") AND ("older adults" OR elderly).

In addition, the reference lists of selected review articles were screened to identify potentially relevant studies not captured in the initial search.

The review excluded non-peer-reviewed materials, conference abstracts, technical reports without patient involvement, narrative commentaries lacking empirical data, and case reports with limited generalizability.

3. Results

The analysis of the studies described above made it possible to identify the key areas of the impact of digital technologies on the geriatric population.

3.1. Characteristics of the included evidence and population

The analyzed studies included adults over 60 years of age. The articles focused on evaluating the effectiveness and patient acceptance of telemedicine solutions such as teleconsultations, video calls, remote monitoring systems for vital signs, wearable devices, and mobile applications (mHealth). The main endpoints of these studies were quality of life (QOL), physical functioning, clinical parameters, and patients' mental health status.

3.2. Impact on quality of life

A strong positive association between telemedicine and improved quality of life in older adults was demonstrated. Studies, including those by Mahal et al., showed a significant increase in QOL scores in groups receiving teleconsultations compared with standard care. Improvement was observed across a broad and diverse range of domains: physical health, social relationships, psychological well-being, and environmental functioning [3].

3.3. Psychiatric illnesses and mental health

Telepsychiatry and applications for monitoring parameters contributed to a reduction in symptoms of depression and anxiety. Observations also indicated that performing measurements independently increased the sense of security, which translated into better mental well-being [4][5].

3.4. Clinical outcomes in chronic diseases

The literature review indicated high effectiveness of remote monitoring in specific disease entities.

Table 1. Summary of telemedicine intervention outcomes by domain – clinical outcomes in chronic diseases.

Domain	Main results
Respiratory diseases	support for self-care; education on proper medication use; early detection of exacerbations; increased self-efficacy; reduction in the number of hospitalizations.
Cardiovascular diseases	non-invasive detection of cardiac arrhythmias; continuous monitoring of patients with heart failure; better blood pressure control; support for stroke prevention; reduction of unnecessary hospitalizations; facilitation of rapid medical intervention in the event of deterioration in health status; improvement in quality of life.
Neurological diseases	reduction of social isolation; improved communication and relationship with the caregiver; decreased symptoms of depression and anxiety; improved quality of life; improved motor function after stroke; increased motivation.
Diabetic diseases	increase in self-monitoring; decrease in HbA1c and postprandial glucose levels; reduction in hypoglycemic episodes; decreased cardiometabolic risk and improvement in the lipid profile; increased knowledge of diabetes; reduction in the number of complications; reduction in care costs.
Postoperative care	the possibility of continuous monitoring and rapid adjustment of lifestyle and pharmacotherapy; fewer postoperative hospitalizations; reduction in care costs; increased satisfaction; alleviation of postoperative anxiety.

Source: compiled by the authors from the reviewed literature.

3.5. Rehabilitation and physical functioning

Studies confirmed that telerehabilitation was at least as effective as traditional rehabilitation [6][7]. These interventions significantly improved muscle strength, balance, and physical functioning, which was particularly important in patients with frailty syndrome [8]. Digital health technologies also improved physical activity levels and contributed to its promotion [9].

4. Discussion

This discussion addresses the applications of telemedicine in several key areas of chronic diseases typical of the older adult population. Telehealth and remote monitoring have been increasingly used in respiratory and cardiovascular diseases, mental disorders, frailty syndrome, neurological diseases, and diabetes. The individual subsections present the available evidence regarding the impact of these solutions on health outcomes and the quality of life of older adults.

Of particular importance for older adults was home telemedicine, which enables more flexible and individualized patient care in the patient's place of residence [10].

4.1 Telemedicine and quality of life

The implementation of teleconsultations in geriatric patients aged over 60 years is considered a highly effective method for improving their overall QOL, as shown, among others, in the study by Mahal et al. The study found that in older patients, QOL improved significantly across all assessed domains compared with the control group (the control group included patients receiving standard care without teleconsultations). After completion of the study, the authors adjusted the results for baseline values to ensure that the observed effect resulted from the use of teleconsultations. The adjusted increase in the total QOL score relative to baseline was more than twice as high in the telecare group (8.61 vs 3.36; $p < 0.001$), suggesting that this effect was not merely due to baseline differences between groups, but rather due to the actual impact of the intervention. The analysis confirmed that teleconsultations significantly improved QOL in terms of physical health, social relationships, psychological well-being, and environmental functioning, compared with standard care [3]. It was also noted that women achieved lower scores than men, which, according to the relevant literature, may result from less interest in modern technologies among older women [5]. At the same time, other studies did not consistently confirm these differences. Mahal et al., however, demonstrated significant differences between younger and older seniors. Younger participants were more willing and more active in using teleconsultations, which translated into greater clinical and functional benefits. This was probably due to better adaptation to the use of new technologies and to a statistically better overall health status in this age group. Their study also showed that individuals with higher educational attainment were more engaged in teleconsultations. These findings were confirmed by the studies of Drosdowsky and Gough, who indicated that as the level of education increased, so did understanding and the effectiveness of telemedicine use [3].

An integral component of telemedicine was also tools used to measure physiological parameters, such as specialized devices, sensors, and wearable devices. They constituted the foundation of modern remote patient care, enabling continuous monitoring of health status. Older adults represented a particularly important patient group requiring ongoing observation, as they were the most heavily burdened by chronic diseases and their consequences. Owing to limited functional capacity and often constrained financial resources, older individuals were characterized by a lower level of independence and a greater need for support from their environment [11].

4.2 Respiratory diseases

Asthma and COPD are the most common chronic respiratory diseases and represent an important area in which the implementation of telemedicine solutions could bring significant clinical and organizational benefits [12]. Telemedicine could, in a multidimensional way, support patients with COPD — from diagnosis and treatment, through monitoring and education, to preventive measures, particularly in the areas of self-management of the disease, regular medication use (especially inhaled therapy), and systematic surveillance of symptoms and respiratory functional parameters. Mobile technologies, such as smartphone or tablet applications and portable digital devices (e.g. “smart” inhalers, home spirometers, and pulse oximeters), could significantly facilitate these tasks, provided that they are permanently integrated into patients' daily practice [12][13]. Telemonitoring could also have an impact on reducing treatment costs, which was considered a significant argument for implementing such solutions into routine care for patients with COPD.

4.2.1 Clinical outcomes and quality of life

The study by Lippi et al. assessed the available possibilities for supporting patients with COPD using telemedicine and remote monitoring devices, indicating promising results in terms of improving quality of life in older adults participating in home-based rehabilitation supported by telemonitoring. At the same time, no additional positive outcomes were observed in the study group, which may suggest that the improvement in quality of life results mainly from the well-documented benefits of pulmonary rehabilitation programs rather than from the use of the technology itself. Noteworthy findings were reported in the study of the number of respiratory events and the number of hospitalizations, as the use of telemonitoring tools led to a reduction in both [14]. The systematic review by Zhuang et al. confirmed that digital interventions, used mainly for rehabilitation and self-care, significantly improved the quality of life of older adults with COPD, as reflected, among other measures, by the CAT (COPD Assessment Test) and EQ-5D (EuroQol-5 Dimension) scores. Self-efficacy increased after 3 months, but this effect disappeared after 12 months. This led the authors to conclude that the improved design of telemedicine interventions, ones that sustain motivation and engagement, could prolong this beneficial effect. At the same time, satisfactory results were not obtained in terms of improving physical capacity (e.g., in the 6-minute walk test, 6MWT), reducing the number of hospitalizations, or achieving a lasting reduction in dyspnea. The authors suggested that the lack of reduction in hospitalizations may result from the absence of consistent clinical actions in response to data collected by patients, as well as from difficulties older adults experience in operating remote monitoring devices [15].

4.2.2 Barriers and patient perspectives

The study by Kouri et al. showed that older adults remain ambivalent toward telemedicine solutions: on the one hand, they viewed telehealth as a valuable tool for supporting independence, while on the other hand, they feared that it could undesirably interfere with the established and familiar model of health care. Available data indicated that older patients with asthma and COPD adhered less well to inhaled therapy recommendations and had limited self-care competencies, despite expressing interest in e-health solutions. This revealed a significant gap: current mHealth tools were not fully adapted to the needs of this population, which prevented their full potential from being realized until these barriers were systematically addressed and reduced [12]. For proper adherence to recommendations, individualization of the patient-centered approach was extremely important. In older adults, it should be taken into account that they may have limited technological skills as well as impairments in hearing, vision, communication, or cognitive function [14].

In summary, telemedicine interventions in the care of older adults with COPD had significant potential to improve quality of life. However, their effectiveness was limited, and further well-designed studies were therefore deemed necessary [15].

4.3 Cardiovascular diseases

4.3.1 Atrial fibrillation (AF)

Early detection and prompt initiation of treatment for atrial fibrillation is crucial for reducing the risk of stroke and cardiovascular mortality. For this reason, researchers sought simple, non-invasive methods for remote monitoring of AF in older adults that would allow screening of large populations. In the study by Fabrit et al., the use of a wristband with a photoplethysmography (PPG) sensor, paired with a smartphone via a dedicated application, was described. The technology used enabled arrhythmia detection in 5% of participants within the first 4 weeks. Notably, most arrhythmic events were recorded during the first week of observation [16]. Shao et al. used a lightweight, discreet ECG patch applied to the chest for continuous AF monitoring, which was easy to use and did not reduce patient comfort. In the event that abnormalities were detected, the recording was assessed by a physician. To date, the system has been tested only on open ECG databases, which confirmed its effectiveness under experimental conditions; the next step would be clinical studies involving patients [17]. In the study by Wong et al., AF screening was proposed based on patients' self-performance of single-lead ECG recordings, together with a physician-coordinated central remote monitoring system. Older adults showed high degree of discipline and performed the measurements regularly. They highly valued the opportunity to actively care for their own health and considered the device easy to use, although some experienced anxiety about receiving an abnormal result or about delayed analysis. Despite these concerns, the study was considered feasible and acceptable for most participants [18]. Gladstone et al. proposed AF screening using a portable ECG monitor, achieving a significantly higher detection rate of atrial fibrillation with good patient tolerance for this monitoring method. In their analysis, they also demonstrated the superiority of this strategy over oscillometric screening using a home blood pressure monitor.

In summary, although further research on the use of telemedicine in AF screening was considered necessary, many authors emphasized that well-conducted screening programs could realistically support stroke prevention in older patients with atrial fibrillation [19].

4.3.2 Heart failure

Bashi et al., who worked on telemonitoring in heart failure, indicated that a key element of this approach is remote monitoring of patient parameters such as blood pressure, heart rate, body weight, and ECG recordings [20]. The most commonly used tools include electronic blood pressure monitors, cardiac monitoring systems (including wireless ECG devices that detect heart rhythm abnormalities), and electronic scales with remote data transmission, that allows continuous tracking of weight changes [21]. Assessment of the usefulness of mobile phones and videoconferencing showed that, despite good accessibility and acceptance among older patients, they did not lead to clinical outcomes as satisfactory as those achieved with more advanced telemonitoring systems. The data collected by the authors suggested that home remote monitoring could improve older adults' quality of life and reduce the need for traditional healthcare services [20]. Moreover, they would allow healthcare workers to intervene quickly if patients' clinical condition worsened. Some studies also suggested reduced mortality in telemonitoring groups, although this effect was not consistently confirmed across all analyses [22]. The results regarding the impact of telemedicine on patients' knowledge and self-care remained inconclusive - some authors reported a clear improvement, while others found no significant changes [20]. The variety of observed outcomes may have resulted from differences in the interventions, treatment regimens, and the varying degree of focus on physical or mental well-being. Regardless of these discrepancies, the authors emphasized that telemonitoring systems, through individually tailored recommendations and support for self-care, made disease management easier and promoted improved quality of life in patients with heart failure [22].

4.3.3. Cardiac telerehabilitation

Cardiac rehabilitation was widely recognized as a very important component in preventing heart-related complications, readmissions, and death in cardiovascular patients. Its remote forms made it possible to achieve these goals regardless of barriers such as distance, lack of transportation, or travel costs. The authors noted the widespread belief that older adults are reluctant to use and adapt poorly to new technologies. However, the results of the first national remote cardiac rehabilitation program (RCR) in Israel, based on smartwatches and apps, showed high effectiveness and acceptance of this approach among patients over 65 years of age. In this group, better adherence to recommendations was observed than in younger participants, along with a significant improvement in physical fitness in exercise tests [23]. Salarvand et al. described the effects of a personalized mobile health intervention in cardiac rehabilitation based on telenursing - one month of individualized support after discharge from the hospital following a myocardial infarction, including regular video calls and education. This intervention significantly increased resilience and inner strength in older adults, which translated into reduced stress and improved self-care [24].

5.3.4. Hypertension

Remote blood pressure monitoring was identified as a factor that reduces the risk of cardiovascular events. In elderly individuals burdened by frailty, cognitive decline, a higher risk of falls and orthostatic hypotension, careful monitoring and appropriate adjustment of antihypertensive medication were considered especially important. However, the authors emphasized that many barriers still need to be overcome before such solutions can bring real benefits on a broad scale [25]. The study conducted by Yue et al. presented the use of an automatic blood pressure monitor that transmitted measurements to a smartphone app, which prompted patients to take measurements, displayed results in charts, sent alerts for abnormal values, enabled contact with a physician and allowed ongoing treatment adjustments. In the telemonitoring group, better blood pressure control and significantly lower systolic blood pressure values were achieved, indicating that remote monitoring could support more effective antihypertensive treatment management, although the authors emphasized that some studies did not confirm a clear advantage of telemonitoring over standard care [26]. Mihevc et al. conducted a 12-month follow-up of blood pressure telemonitoring in older adults using a smartphone connected via Bluetooth to a blood pressure monitor and a glucose meter. The study showed improved blood pressure and glycemic control, while no changes were found in other cardiovascular risk factors or in diabetes-related quality of life. The authors suggested that the beneficial effects may have resulted from better patient-physician cooperation and the early detection and modification of exacerbations. At the same time, older patients reported difficulties in using the devices (touchscreens, forgetting passwords, pairing problems), highlighting the need to better adapt remote monitoring systems to the needs and abilities of seniors [27].

4.4 Physical capacity, frailty syndrome

Specific data showed that digital health interventions had a statistically significant effect on increasing moderate and vigorous physical activity and also served to promote it. This was considered an important positive factor in improving health and preventing many chronic diseases in older adults [9].

4.4.1 Remote exercise programs

The systematic review and meta-analysis conducted by Toledano-Shubi et al. confirmed the findings of many studies showing that remotely delivered exercises (e.g. via videoconference) were at least as effective as traditional in-person programs. Training conducted in “virtual groups” proved to be a highly effective intervention aimed at improving balance and muscle strength in older adults. It also supported mental health by positively affecting emotional well-being. The authors also emphasized the organizational and economic benefits of such solutions, including reduced travel costs and time. They also noted the ability to care for a larger number of patients at the same time, which would translate into more efficient use of staff resources. Such telemedicine interventions could significantly increase adherence to WHO recommendations on physical activity levels (150–300 minutes per week of moderate-intensity activity) in older adults and contribute to improving their quality of life [6][7].

4.4.2 Frailty syndrome and telerehabilitation

The use of telehealth technology to increase physical activity levels was very useful for all older adults receiving treatment for frailty syndrome. Frailty affects up to 24% of people over 60 years of age and may be associated with a significant risk of falls, loss of independence and even complete disability [8]. The meta-analysis conducted by Han et al. showed that, thanks to the e-Health intervention, patients with frailty syndrome improved their muscle strength and overall quality of life. The authors also described the effectiveness of telerehabilitation in patients with disabilities after COVID-19, when the possibility of taking part in traditional rehabilitation was significantly limited. Patients used educational videos with detailed exercise instructions, as well as the care of a physiotherapist who could remotely monitor the rehabilitation process and modify the exercises. Such an intervention may therefore constitute a real alternative to inpatient rehabilitation. Wider use of this type of solution could increase access to rehabilitation for people with limited ability to leave home. Frailty syndrome and the overall quality of life of older adults were also influenced by other modifiable parameters such as sleep and nutritional status. Telemedicine technologies made it possible to monitor and collect data, which in turn allowed preventive measures to be introduced early enough. Wearable technologies (e.g. bands, watches, inertial sensors) could be used for this purpose [28].

4.5 Psychiatric illnesses and mental health

Older adults were often affected by mental health problems, which significantly reduced their quality of life. This problem was worsened by a gap in the healthcare system resulting from low awareness, stigma, financial barriers and transportation difficulties. Telemedicine could effectively meet these and other needs. Psychiatric teleconsultations were a convenient solution and were positively evaluated by both patients and specialists [29].

Belanger and Winsberg conducted a retrospective analysis of data from a nationwide remote psychiatric service company (Brightside). They showed that older adults achieve similarly favorable treatment outcomes for depression as younger patients. Both groups benefited from a reduction in the severity of depressive symptoms. On this basis, it could be concluded that telemedicine did not constitute a significant barrier for older adults, moreover, it could be a useful tool supporting improvements in their mental health [4]. The other authors also indicated that older patients handled smartphones and online consultation technology very well and when needed, they received the necessary help. Modern solutions were therefore not a barrier to obtaining care [29].

Lang et al. conducted a study assessing health-related quality of life in older adults with multimorbidity, both with and without depression and/or mild cognitive impairment (MCI). They used a telemonitoring application. The results indicated that the use of vital-sign monitoring technology promoted improvements in mental health-related quality of life and stabilization of physical functioning parameters. A key factor positively affecting patients' psychological well-being was the ability to perform measurements regularly, which increased their sense of security. A clear relationship was found between careful, even “excessive,” measurement activity and beneficial changes in mental health, especially in patients with baseline depression or MCI [5].

4.6 Neurological diseases

4.6.1 Degenerative diseases

It has been shown that dementia, primarily Alzheimer's disease, affects around 8 million Europeans these days, mostly older adults. It made patients with neurodegenerative diseases a key group in which telemedicine could provide important support for both patients and their caregivers. It could also serve as a response to the challenges facing healthcare systems [30]. Many studies indicated that telemedicine was an effective tool for improving care for people with dementia, particularly in the area of mental well-being, by reducing symptoms of depression and anxiety. The literature highlighted several benefits of such solutions: increased satisfaction, reduced risk of falls, as well as less social isolation and better relationships and communication between the patient and the caregiver. The positive financial effect was the potential economic savings [30][31]. Borges do Nascimento et al., however, pointed out that despite the promising results, the available evidence was often inconclusive and not very satisfactory, which justified the need for further, more robust studies. The authors also emphasized existing barriers: the need for direct contact, concerns about privacy and data security, technological difficulties (e.g. fast internet connection, device availability) and insufficient adaptation to new technologies [31]. In some patients, specific symptoms of dementia could make it difficult to use telemedicine services, especially cognitive impairment [30]. An additional challenge was the frequent presence of sensory impairments, mainly worsening vision and hearing. Appropriate training for patients and caregivers, provision of adapted equipment, and ongoing support from the caregiver played an important role in overcoming these limitations [32].

4.6.2. Neurological rehabilitation

Telemedicine has shown considerable potential as a tool for remote cognitive rehabilitation in neurodegenerative diseases, particularly in settings where the conventional face-to-face care model is difficult or impossible to implement. Telerehabilitation may be based on various technological solutions, including sensor-based systems, tele- and videoconferencing, dedicated software, and virtual reality. The authors emphasized that such interventions could significantly improve access to care, representing a viable alternative to traditional services. Although most programs relied on the active involvement of caregivers, there was evidence that remote solutions could also be effectively implemented in individuals with mild cognitive impairment living alone. Studies on telerehabilitation in patients with dementia suggested that its effectiveness and reliability were comparable to conventional rehabilitation, although the authors stressed the limited number of available studies and their methodological limitations [32].

According to the sources, telerehabilitation most commonly involved patients after stroke, with injuries, multiple sclerosis, and Parkinson's disease [32]. The Health StrokeNet Telerehab study showed that remote rehabilitation based on exercises and stroke education improved upper-limb motor function to a degree no worse than live rehabilitation [33]. Many studies also reported that remote physiotherapy, including speech therapy, in post-stroke patients achieved outcomes comparable to standard in-person interventions [32]. Studies observed an increase in participants' motivation, although it was somewhat lower than in patients undergoing rehabilitation in clinical settings. Interestingly, the literature reported the development and testing of interactive exergame systems supporting limb and balance rehabilitation, in which patients performed motor tasks in a game-like format, thereby training their motor patterns. Despite the small sample sizes, the results of these projects were promising and indicated a positive effect on motor function, engagement, and patient motivation that was comparable to traditional rehabilitation [33].

4.6.3. Parkinson's disease

Patients with Parkinson's disease often experienced difficulties with mobility, which made regular participation in center-based rehabilitation challenging. Therefore remote forms of support were particularly important for them. In a study by Ge et al. using a mobile application, telerehabilitation was compared with home-based physiotherapy delivered by a qualified therapist, showing improvement in motor function and quality of life over 4 weeks. Improvements in gait and balance were also reported, which may translate into a reduced risk of falls. However adherence to recommendations and outcomes in motor tests, balance and knee extensor muscle strength were somewhat lower in the telerehabilitation group [34]. Yang et al., in their meta-analysis, found that home-based exercises may alleviate motor symptoms, minimize limitations in physical activity, and improve independence as well as quality of life in patients with Parkinson's disease [35]. Similar conclusions were presented by Putzolu et al., who additionally indicated that support via a mobile application promotes an increase in daily physical activity [36].

4.7 Diabetic diseases

The use of telemedicine in the care of older patients with diabetes enabled more effective disease management and improved self-care. This was achieved through remote medical consultations and personalized recommendations, including dietary and lifestyle advice, provided by qualified healthcare personnel [37].

4.7.1 Education and self-management

Effective patient education made it possible to reduce the risk of complications, increase the level of self-monitoring, and lower healthcare costs. The authors indicated the high usefulness of remote educational programs on diabetes in patients after hospital discharge. These interventions were rated by participants as useful and easy to use. A decrease in HbA1c values was observed (although it did not reach statistical significance due to the small sample size) and an increase in disease-related knowledge, measured with an appropriate test was also noted [38].

4.7.2 Clinical and metabolic outcomes

Sun et al. conducted a study in which the research group received medical support using a mobile app and glucose meters capable of data transfer. Every two weeks, medical teams provided patients with recommendations and reminders to measure their blood glucose levels via app or phone. After three months, a significant decrease in postprandial glucose concentration was noted, whereas after six months, a reduction in plasma glucose and glycated hemoglobin was observed compared with both baseline values and the control group. In addition, fewer episodes of hypoglycemia occurred in the study group [37]. Literature reviews on the impact of telemedicine on the treatment of patients with type 2 diabetes indicated a significant reduction in cardiometabolic risk and improvement in parameters such as HbA1c and postprandial blood glucose in patients receiving mHealth-based care compared with standard care. A beneficial effect on the lipid profile was also reported, including a reduction in triglyceride levels [39].

4.7.3 Technology adaptation and cognitive barriers

The authors emphasized that, despite common concerns, older adults cope well with modern technologies, particularly smartphone use, and that their use in telemedicine may have a positive effect on the health status of this patient group. At the same time, they indicated that continuous support and monitoring are key elements of effective diabetes treatment in older adults [37]. However, it should be taken into account that many patients in this group experience cognitive impairment, which makes it difficult to use telemedicine solutions. Therefore, appropriate adaptation of the technology to their needs and capabilities was considered necessary [39].

4.8 Postoperative care

Confirmation of the benefits of telemedicine in postoperative care for older adults was provided by a study by Wang et al., in which geriatric patients after surgical procedures were randomly assigned to either a standard care group (control group) or a telemedicine-based postoperative care group (study group). Medical staff continuously monitored the condition of patients in the study group and if adverse symptoms occurred, treatment could be promptly adjusted. The observations also included remote monitoring of chronic diseases and delivery of rehabilitation at a distance. The results, assessed after one month of follow-up, indicated that remote care performed very well in this patient group. The study group required in-person hospital visits significantly less often and made less use of them, which translated not only into a higher level of patient satisfaction but also into improved access to medical services, better quality of care and reduced costs. Such interventions also showed a beneficial effect on patients' mental health in the postoperative period, as confirmed by observations from the COVID-19 pandemic. It is worth noting that better outcomes in alleviating negative emotions and building the relationship between medical staff and the patient were observed with video consultations compared with telephone-only contact. This suggested that the form of remote communication (visual vs. voice only) had a significant impact on the effectiveness of psychological support provided to older adults within telecare [40].

Table 2. Telemedicine Tools and Their Clinical Applications

Device / Technology	Clinical Application
Wristbands (PPG sensor)	Cardiology (AF)
ECG patches and portable ECG monitors	Cardiology (AF, heart failure)
Electronic blood pressure monitors and scales (data transmission)	Cardiology (Hypertension, heart failure)
Smart inhalers, spirometers, and pulse oximeters	Pulmonology (COPD, asthma)
Bluetooth glucometers and mHealth apps	Diabetology (Type 2 Diabetes)
Video conferencing and teleconsultations	Psychiatry, rehabilitation, postoperative care
Interactive motion games and Virtual Reality (VR)	Neurology (Stroke, Parkinson's)
Telerehabilitation systems	Frailty syndrome, post-COVID-19 recovery

Source: compiled by the authors from the reviewed literature.

5. Conclusions

Widespread implementation of telemedicine and remote monitoring devices became a response to demographic challenges associated with population ageing. An analysis of the available studies and publications led to the conclusion that the use of these modern solutions significantly improved older adults' overall quality of life. It also enhanced their physical and mental well-being. The use of telemedicine in chronic diseases enabled better control of clinical parameters, a reduction in adverse complications, and fewer hospitalizations. Remote rehabilitation, being as effective as its traditional form, made it possible to maintain an appropriate level of function and independence in individuals with frailty syndrome, neurological disease or cardiovascular disease. Through telepsychiatry tools and support systems, geriatric patients also benefited from reduced feelings of social isolation and from a decrease in symptoms of anxiety and depression.

Despite the high level of acceptance of new technologies among older adults, the need to adapt interfaces to the sensory and cognitive deficits of older patients should not be overlooked, along with the provision of continuous support and education. This was considered essential for maintaining seniors' motivation and sustaining a high standard of care.

In summary, the development of telemedicine not only increased access to specialist care, but also generated economic benefits for the healthcare system, enabling older adults to age safely in their own place of residence.

Author Contributions:

Karolina Dzień contributed to the conception of the study, literature review, data analysis and preparation of the original manuscript draft. Aleksander Kamecki, Stanisław Kucharczyk and Zuzanna Rak contributed to methodology development, manuscript revision and supervision of the project. Filip Sarek, Alicja Wielogórska, Karol Józwick and Zuzanna Ignatowska contributed to literature collection, data interpretation and critical revision of the manuscript. All authors approved the final version of the manuscript.

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No new data were created or analyzed in this study.

Conflicts of Interest

The authors declare no conflict of interest.

Artificial Intelligence Use Disclosure

In preparing this work, the authors used Perplexity.ai for minor language correction, grammar improvement, formatting assistance and translation. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

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