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Telemedicine and Assistive Technologies as Support to In-Home Care to People with Dementia: A Review

Barbara Lovrečič, Maja Štibernik, Maruška Vidovič, Mercedes Lovrečič

National Institute of Public Health, Ljubljana, Slovenia

ABSTRACT

Dementia has a profound impact on the lives of the patients, their relatives and society. People with dementia are increasingly dependent on the help of others, so it is important to support them to be independent at home as long as possible. We reviewed the literature, using PRISMA methodology, on use of telemedicine and assistive technologies in people with dementia living at home and how they assessed their experience and applicability of new technologies after their use. According to the studies included in the results in our research, people with dementia are capable to use new technologies, especially if there are tailored to their needs and if they are designed, developed around and with the users. People with dementia could offer important feedback information and assessment about use of modern technologies.

Key words: *dementia, telemedicine, self-help devices, assistive technologies, home care services, medical anthropology*

Introduction

As the seventh leading cause of death in the world, presently 55 million people worldwide have dementia, with a foreseeability of 10 million new cases yearly, and a median survival of 7 to 10 years from the first symptoms of the disease[1,2]. As an impaired mental process, this clinical syndrome can be triggered by several genetic and lifestyle risk factors, leading to different brain pathologies. Considering the complexity of dementia with co-occurring multiple other pathologies requires an advanced holistic approach and prevention care support for patients[3].

Telemedicine (TM) is defined as a tool used to provide healthcare services at a distance over telecommunications technology[4]. The first mention of "telemedicine" dates back to 1897, between a pediatrician and a bedridden patient at home who received a telephone consultation by listening to the child's cough and diagnosing the absence of diphtheria[5]. Video TM is a promising model for providing dementia services for patients who live in rural areas and for whom traveling to a specialist clinic is burdensome[6]. World Health Organization (WHO) announced the outbreak as a pandemic SARS-CoV-2 on 11 March 2020[7]. During the time of Covid-19, many people have adapted to a new way of working and attitudes toward the use of information communication technology (ICT). It has been shown that older people felt relief when using ICT during the pandemic, due to the sense of connectedness in social networks and communities. ICT for instance smartphones, tablets, smart home systems, and robots are also being used to facilitate dementia care. With the aforementioned technology, it is possible to support problems with memory, orientation, safety, care provision, medication management, cognitive therapy, active leisure time with various online activities, and education[8]. During the Covid-19, vulnerable groups, especially the elderly, felt loneliness, fear of the unknown, and obstacles in everyday tasks, including restrictions on social support at the community level. Social distancing could seriously compromise their quality of life and affect their long-term health. Aging is additionally associated with physical, psychosocial, and environmental vulnerabilities, while a pandemic can provoke one to experience these feelings more intensely. It was important to find a balance between social isolation and safety distance, to prevent the worsening of psychological symptoms and existing mental health[9]. TM represented a key element in this period and simultaneously proved to be a cost-effective alternative method for the uninterrupted provision of services and compatible with social distancing measures[10].

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Slovenia is characterized by dispersed and sparse settlements. The population is concentrated in the larger urban centers, while rugged regions with worse natural geographical conditions and less accessible municipalities are sparsely populated[11]. In Slovenia, demographic aging statistically characterized since the middle of 2003. In 2005, the aging index was 106.9, while in 2015 was steadily increased by 121.4, with the last outcome in mid-2021 at 138.7[12]. Compared to the European structure of aging in 2022, Slovenia had 21.1% of the share of people aged 65 or older in the total population, which ranked us in the 7th place by demographic ageing countries with the highest share of Italy with 23.8%[13]. The increase in the age of the population requires a greater need for more doctors, specialists, and other health professionals. Slovenia is a geographically diverse country therefore access to health services is difficult for some residents of remote areas[14]. According to the statistics from the Medical Chamber of Slovenia, in 2021 in Slovenia were 64 family medicine doctors per 100,000 inhabitants, while the European Union averaged decree 105 doctors[15]. Furthermore, access to mental health services is also unevenly distributed between the Slovenian regions. In 2020, the highest number of 19 psychiatrists per 100,000 inhabitants was in Ljubljana, and 14.3 psychiatrists in Maribor. The lowest number of psychiatrists was employed in Novo mesto by 4.4 psychiatrists, and in Ravne na Koroškem 5.6 psychiatrists per 100,000 inhabitants[10]. Similarly in 2021 in Slovenia were 5.5 neurologists per 100,000 inhabitants, while the European Union averaged decree 6.6 neurologists per 100,000 inhabitants. Access to neurologic health services is unevenly distributed, too, lowest in Gorenjska region (3.4/100,000 inhabitants), followed by Primorsko-goriška region (4.1/100,000 inhabitants) and Prekmurje (4.4/100,000 inhabitants)[15]. For elderly patients with dementia living in rural areas become a challenge regarding limited access and long travel times to specialized clinics, even before covid-19 pandemia and increase during lockdown due to pandemia. Remote solutions of TM and other useful assistive technology (AT) represent convenient and potential helping tools regardless of geographical location[16]. New solutions to elderly needs, such as recovery, independence, and the lengthening of a healthy life can be offered by new scientific and technological developments[17]. According to data from the Statistical Office of the Republic of Slovenia, in 2021, 62% of people between the ages of 65 and 74 were Internet users, of whom 48% were older people who used the Internet for health-related activities. During this period, 45% of older people lacked digital skills and knowledge to use ICT. In the first quarter of 2021, 95% of the population of Slovenia between the ages of 65 and 74 used a mobile phone. Of these, 58% were smartphone users, and 42% were mobile phone users with basic calling and texting capabilities[18]. Baby boomers may differ from the silent generation concerning their exposure and adaptability to new technologies. Estimations for the largest older adult cohort in history, baby boomers will overcome the barriers to consumer health technologies to meet shifting demands in the healthcare system[19]. Slovenia has on one side a high rate of people with dementia, on the other side a lack of professional staff for the treatment and care of people with dementia, uneven access to assistance services and long waiting times for institutional accommodation. Modern technology could help people with dementia living at home.

In our study we tried to assess the possibilities of TM use at home-based settings by people with dementia, possibilities to use other practical assistive technologies systems and assessment of experience and usability by people with dementia themselves.

Methods

We performed a systematic review of the literature in the PubMed database, using a guided protocol Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[20]. Firstly, we searched for articles with keywords: ("dementia" OR "Alzheimer*") AND ("telecare" OR "telehealth" OR "telemedecine" OR "telerehabilitation" OR "ICT" OR "virtual* visit*" OR technolog* OR device* OR "assitive technology" OR innovation* OR "silver econom*" OR "AI*") AND ("home dwelling" OR "home support" OR "homebound" OR "in-home" OR "home resident*" OR rural OR remote OR "home based" OR "living at home" OR "home-setting"). The search was conducted from January 1, 2020 to February 23, 2023, and filtered within the English language, with 665 articles results. Inclusions were limited to studies with specifically documented the serviceability of telehealth or assistive technologies (AT) among people with Alzheimer's disease or dementia-centered in-home care. The resulting applied content criteria were 67 articles left for further review. Additionally, we eliminated 39 publications regarding telehealth interventions for particularly caregivers and excluded 19 articles published as systematic reviews, research posters, and research protocols, where assessment by people with dementia regarding experience/usability were not reported.

We set the content criteria for the articles included in the results of this review:

A) Chronological criteria and technical criteria: contributions published between 1.1.2020 and 23.3.2023 in English language

B) Content criteria: studies involving the usability of telehealth, telerehabilitation, and AT to improve patient wellbeing

C) Content criteria: included people with Alzheimer's disease or dementia

D) Content criteria: studies focused on in-home care environments for people with Alzheimer's disease or dementia

E) Content exclusion criteria: studies about delivering telehealth approaches to caregivers

F) Content exclusion criteria: studies where assessment by people with dementia regarding experience/usability were not reported (published systematic reviews, research posters and research protocols).

The literature review was supplemented by an overview of the sources cited in the selected contributions. Other forms of contributions were provided when appropriate.

Results

We identified 9 publications in our process of selecting the papers. Figure 1 schematically shows the course of search and inclusion of articles in the literature review. Most of the research articles focused on the successfulness of using TM, telehealth, and telecare services at home-based settings among people who suffer from Alzheimer's disease or dementia and resulting in the use of implementation services as an alternative face-to-face clinical visits approaches and other practical AT systems as a helpfulness tool for patients who want to continue with living at home.

The general characteristics of included studies about TM applications for older adults with dementia to deliver medical services via direct-to-home access are detailed in Table 1. An overview of other assistive devices or systems to help to maintain or improve a person's ability to do things in everyday life at home is summarized in Table 2.

Discussion and Conclusion

The global prevalence of patients with dementia to estimations by 2050 will be 151 million. Whereas Western Europe will experience a proportionate increase in dementia prevalence by 100%, North America by 170%, China/Western Pacific by 336%, and Latin America by 393%[3].

One-fifth of the population of Slovenia is represented by persons over 65 years of age, with an overall average of oldest individuals living in rural areas than in metropolitan locations[12,30]. Since 2015, the Association of Social Institutions of Slovenia reported a significant growth trend in the number of people waiting for a reception in a nursing home. The number of applicants reached the maximum in 2008 and a comparable peak in 2020 with the relatively constant index of occupancy over the past few years, with minor fluctuations. There are also significant differences in capacity coverage between Slovenian regions and current applications, with the highest recorded number of applicants in Ljubljana in 2020. The average age of users of institutional care is continuously rising as well as the increased need for services for people with dementia. In 2009, 5.9% of residents were living in long-

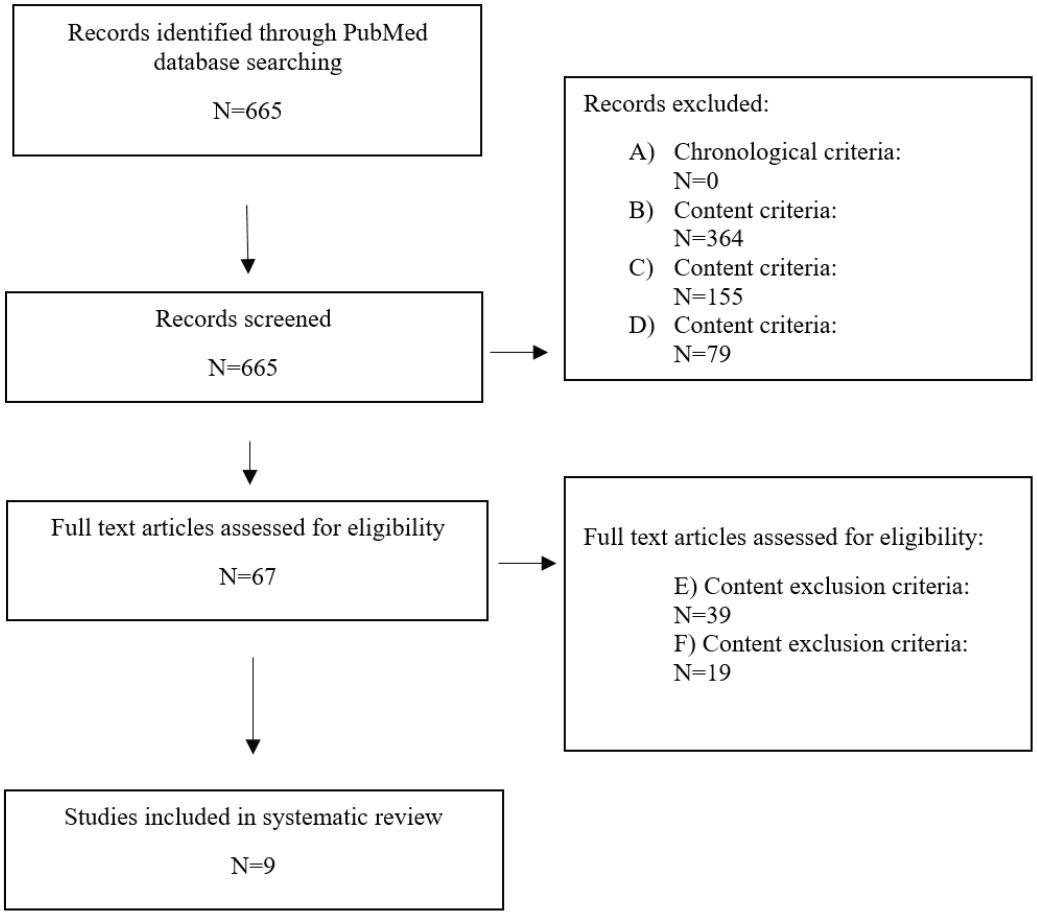

Fig. 1. Flowchart of the literature review process

TABLE 1

THE GENERAL CHARACTERISTICS OF INCLUDED STUDIES ABOUT TELEMEDICINE APPLICATIONS FOR OLDER ADULTS WITH DEMENTIA TO DELIVER MEDICAL SERVICES VIA DIRECT-TO-HOME ACCESS

COUNTRY/ STUDY DESIGN	AIM OF THE STUDY	SAMPLE	METHODS/ INTERVENTION TOOL/ INSTRUMENT USED	MAIN RESULTS	SOURCE
United Kingdom/ Pragmatic study utilizing the plan, do, study, act cycle as the study framework	Explore feasibility of TC and VC Memory Clinic (MC) consultations during the pandemic.	100 consecutive patients on the MC waiting list for a first appointment with a mean age of 77.5 years. Out of 100 patients, 12 had a home assessment, moved away, been hospitalized, or died. 45, 21 and 6 preferred F2F, VC and TC assessments respectively. 16 were not contactable and were offered a F2F appointment.	Consecutive patients on the MC waiting list were telephoned and offered an initial appointment by VC or TC. ACE-III and MoCA were used for assessment in VC, and MoCA-blind for TC. Satisfaction, with VC or TC, was assessed through questionnaires sent to patients for return by post.	The main reason for preferring F2F was non-ownership, or inability to use an internet-enabled device (80%). VC and TC preference reasons were unwillingness to come to hospital (16/27, 59%), and convenience (11/27, 41%). The mean age was lowest for VC appointment (X±SD)=75±15.4 vs TC 87.3±3.9. In 94% cases of VC patient reported "I was able to talk to the doctor as I would in a normal hospital appointment« and in 100% of cases »Overall, I was satisfied with my clinic appointment«. The attendance rate was 100% for VC and TC, while 77% for F2F. Feasibility (successful consultations) was seen in 90% (VC) and 67% (TC) patients. The two patients with failed VC were due to connection problems.	21
United States/ Randomized controlled trials	Assess feasibility of home-based, self-administered, and long-term individualized cognitive training using Constant Therapy (CT) in patients with AD. Evaluate the preliminary efficacy of the CT training program with assessments of cognition and daily life functioning.	19 participants with AD in the MCI and mild dementia stages.	Before starting the intervention phase, participants were trained on how to use the CT app and how to navigate an Apple iPad (how to access the app, switch between tasks, and complete each individual task). iPads were loaned to participants if they did not already own one. Outcome measures were assessed using: MoCA, RBANS, MMQ, ADL, QOL-AD, NAB for Memory, ZBI, and FMQ. Following the initial neuropsychological assessment, the patients were randomly assigned to CT group (N=10) or to Active Control group (ACG) (N=9). Data were collected over 48 weeks.	The median age of patients in CT group was 72.5, while in ACG 75.0 years. The long-term use of the CT program was feasible in a patient population with AD. The adherence rate to the study at 24 weeks was 80 % (8/10) in CT group and 55% (5/9) ACG. On average, participants in CT group engaged with the app a mean of 121.4 days (out of 168 days), with 31.7 minutes spent on the app per day. The overall sustained performance on computerized tasks shows that the individualized training approach modeled by CT is appropriate for a population with AD. The computerized cognitive training may lead to improvements in cognitive performance in the executive function domain. Patients performed more accurately over time in the task training domains of visual and auditory memory, attention, and arithmetic. Latency also improved in tasks related to visuospatial processing, visual and auditory memory, attention, quantitative reasoning, and arithmetic skills. Faster reaction time may suggest improvement in processing speed, as well as improved adaptability to computerized tasks. Faster reaction time not paired with improved accuracy may also represent increased disinhibition while completing the task.	22

United States/ Proof-of-Concept study	Identification of the acceptability and feasibility of a sensor-based in-home interactive exercise system, called tele-Exergame, to improve balance and cognition during distractive conditioning with remote supervision through a telemedicine interface.	14 adults (12 females) with MCI or dementia.	Before and after 6 weeks, participants' acceptance was assessed by TAM, while participants' cognition and anxiety levels were evaluated by MoCA and BAI.	The mean age was (X±SD)=68.1 ± 5.4 years. 35.7% of participants were identified as having a high concern of falling and 28.6% at risk for clinical depression. After completing 6 weeks of in-home exergaming exercises, participants significantly improved their cognition level and lowered their anxiety level. Results support acceptability, feasibility, perceived benefits, a potential benefit to preserve cognitive function among older adults with MCI and dementia and positive attitudes toward the use of the system.	23
Spain/ Randomized controlled trial	Explore the impact of providing television-based and telephone-based health and social support and to study the effects of a television-based assistive integrated technology, TV-AssistDem.	93 participants with MCI or mild dementia: 60/93 (65%) were women. Intervention group N=47 (51%) and control group N=46 (49%).	Telephone-based survey research according to GFHP. .	Age X±SD=73.3±6.1 years There were no significant differences between the intervention and control groups in: - any sociodemographic variables, health status variables, or other variables associated with Covid-19. - regarding health management, mental health, well-being, or sleeping problems. Respondents with TV-AssistDem performed more memory exercises than control participants (24/93, 52% vs 8/93, 17%; p<0.001). Recreational activities have also demonstrated benefits in dealing with challenging situations and by providing information from available resources regarding Covid-19 improved the experience of confinement.	24
Denmark/ Qualitative research	Identify barriers and facilitators to the usability of MBT in older people with mild dementia at home.	Out of 23 persons with dementia, 4 patients participated in the study (between 67 and 82 years old), 3 males and 1 female. 2 of them were diagnosed with AD and 2 were diagnosed with unspecified dementia.	The MBT intervention was based on an online administrative system. The MBT instructor (physiotherapist) sat up a training program based on each participant's physical capabilities, installed on a device used in the participant's home (touch screen, camera, modem). The program guided the participant via on-screen text, audio and video. The camera registered the participant's movements with feedback from the device if the exercises were performed incorrectly. The device's data was accessible by the managing physiotherapist. The study was conducted on multiple qualitative methods, combining participant observations, semi-structured individual interviews, focus group interviews, and informal interviews during participant observations. Cognitive function was measured by MMSE, NPI-Q, quality of life was measured by EQOL5.	Two participants enjoyed MBT as they could control the frequency and intensity of the training. Other participants challenged the technology, the placement of the device, or the lack of motivation to independently complete the training, and in general were not satisfied with replacing group training with home-based training. The study identifed potential benefts and challenges resulting from home-based MBT training: the sense of having lost the opportunity to be with like-minded individuals in group training; the screen caused marital conficts; and the screen enhanced feelings of freedom and independence. No clear answer to whether MBT increases quality of life, but it can be seen as a supplement to in-person group training.	25

Legend

TC- Telephone Conference, VC- Video Conference, MC- Memory Clinic, F2F- Face to Face, ACE-III - Addenbrooke's Cognitive Examination-III, MoCA - Montreal Cognitive Assessment, MoCA-blind - Montreal Cognitive Assessment -Blind, CT- Constant Therapy, AD- Alzheimer disease, MCI- Mild Cognitive Impairment, RBANS- Assessment of Neuropsychological Status, MMQ- Multifactorial Memory Questionnaire, NAB- Neuropsychological Assessment Battery, ADL- Activities of Daily Living Scale, QOL-AD- Quality of Life in Alzheimer's Disease Scale, ZBI- Zarit Burden Interview, FMQ- False Memory Questionnaire, ACG- Active Control group, TAM- Technology Adoption Model, BAI- Beck Anxiety Inventory, GFHP- Gordon's Functional Health Patterns. Quantitative strategies, TV-AssistDem- TeleVision-based ASSistive Integrated Service to supporT European adults living with mild DEMentia or mild cognitive impairment, MBT- Motion-Based Technology, MMSE- Mini-Mental State Examination, NPI-Q- Neuropsychiatric Inventory-Questionnaire, EQOL5- European Quality of Life 5

TABLE 2

AN OVERVIEW OF OTHER ASSISTIVE DEVICES OR SYSTEMS TO HELP TO MAINTAIN OR IMPROVE A PERSON'S ABILITY TO DO THINGS IN EVERYDAY LIFE AT HOME

COUNTRY/ STUDY DESIGN	AIM OF THE STUDY	SAMPLE	METHODS/ INTERVENTION TOOL/ INSTRUMENT USED	MAIN RESULTS	SOURCE
Italy/ Exploratory Study	To evaluate the usability and acceptability of the ECA, which are seen as screen-based entities designed to stimulate human F2F conversation skills, allowing for natural human-machine interaction. To evaluate the usability and acceptability of the virtual agent Anne by people living with dementia. To assess the ability of target users to use the system independently and receive valuable information from it.	20 users in the early stages of dementia, 30% (6/20) were male, and 70% (14/20) were female. 6 participants had previous experience using tablets for leisure activities and had a medium or high level of education.	Users responded to the QOL-AD and the Almere Model, as an acceptance of socially assistive robots, at the beginning and end of the 4 weeks of use. At the end of the period, users also responded to the questionnaires: SUS, IOS, and some unstructured short questions about the general impression of the system.	Age X±SD=75.5±4.2 years The virtual agent Anne reached a positive result among older adults with a mean score of 67.1 compared with an acceptable average score of 68. Most older adults perceived Anne as a friend (6/14, 40%), and, 70% (14/20) responded that Anne was seen as a way to improve their well-being. The remaining 30% (6/17) did not find any connection between the quality of life and Anne. Overall, participants involved in this study demonstrated a positive approach to Anne: after 4 weeks of use, they were less anxious about interaction with Anne and more skilled in basic functionalities, and half of them perceived a role for the ECA. None of the participants withdrew from the trial, and they all provided useful feedback to facilitate the understanding of the data gathered. Anne was perceived as a companion able to support memory and enjoyment needs. Anne served as a source of entertainment and as a way to handle adherence to medication plans. It seems that ECAs could be a promising way to cope with the health and well-being of people with dementia if they are designed, developed, and assessed around and with the users. The first challenge is to target the disease process from its earliest stages and follow the person throughout the journey to foster healthy aging and improve the lives of older people, their families, and the whole community.	26

United Kingdom/ Preliminary evaluation	To develop a prompting device that could be used independently by a person with dementia and their carer in a home environment with little or no training. To use the toolkit to carry out the activities (prepare a simple snack, switch on music/TV, etc.).	Out of the 14 dyads, 3 of them withdrew before starting the study. In 11 dyads were 11 patients with mild to moderate levels of cognitive impairment due to dementia. 4/11 were male and 7/11 were female. Other 11 participants were their primary carers.	A prototype package (a touchscreen tablet computer with a user-friendly interface, bespoke software and an accompanying manual) was developed. A tablet-based prompter suitable for people living with dementia was developed, along with a detailed guidance manual. Data domains were collected by ACE-III, CVLT-II, D-KEFS-TM, ADKS, GAS, Log of prompter use with automatic records, and Ratings of success questionnaire.	Age X±SD=81±5.9 years At the end of the 4-week trial, all 11 dyads reported that they had been able to break down at least one activity into steps and then load these onto the prompter. 8 of the 11 dyads reported that the person living with dementia had been able to read the instructions on the prompter and to follow these to complete at least one step in a task successfully. Of the 22 goals set by participants living with dementia, 14 were fully met, 1 partially met and 7 not met. The majority of goals that were met (8) related to becoming more independent. This study provides preliminary evidence that people living with dementia and their carers can successfully use a touchscreen tablet and prompting software to complete tasks without additional support.	27
United States/ Qualitative descriptive study	To identify benefits, challenges and facilitators in participating in remotely supervised online CY and virtual socialization from the insights and perspectives of a small group.	8 people with dementia attended the focus groups, 2 participants with AD, 6 with other dementias. 5/8 were male and 3/8 were female.	The study was guided by TAM. For eligibility of participants MoCA was used. In the end participants responded on short questions about the general impression of the program.	Age X±SD=81.4±8.7 years The results confirmed that the 8-week online CY intervention was advantageous for emotional regulation and mental health, better sleep, and physical improvement. The first challenge was technological difficulties due to unfamiliarity with video conferencing regarding the older population, and the second was the limited social interaction in the CY.	28
United Kingdom/ Pragmatic, randomized controlled trial	To establish whether or not AT and telecare assessments and interventions extend the time that people with dementia can continue to live independently at home and whether or not they are cost-effective.	Out of 495 participants with dementia, 248 were randomized to receive the full AT and telecare: 102/248 were male, 146/248 were female, while 247 were randomized to the limited control package: 103/247 were male, 144/247 were female.	Assessment points and the measures for people with dementia were used by the BADLS, CES-D, MMSE. The evaluation considered three outcomes: days to institutionalization, change in the EQ-5D and QALYs. Data on the acceptability, applicability, and reliability were collected using the SUTAQ.	Age X±SD=81.0±8.2 years in group with full AT and telecare, age X±SD=80.8±7.4 years in group with limited control package. Outcomes showed a poor fit between the AT and telecare needs and the assessment recommendations (τ=0.242; p<0.000) and a moderate fit between the AT and telecare recommendations and the installations (τ=–0.470; p<0.000). A full package of AT and telecare did not increase the length of time that participants with dementia remained in the community and did not increase participants' health and social care or societal costs.	29

Legend:

AD- Alzheimer disease, ECA- Embodied Conversational Agents, F2F- Face to Face, QOL-AD- Quality of Life in Alzheimer Disease scale, Almere Model- Assessing Acceptance of Assistive Social Agent Technology by Older Adults, IOS- Inclusion of Other in the Self Scale, SUS- The System Usability Scale, ACE-III- Addenbrooke's Cognitive Examination-III, CVLT-II- California Verbal Learning Task, D-KEFS-TM- Trail Making Component of the Delis Kaplan Executive Functions System Test Battery, ADKS- Alzheimer's Disease Knowledge Scale, GAS- Goal Attainment Scale, CY- online Chair Yoga, TAM- Technology Acceptance Model, MoCA - Montreal Cognitive Assessment, AS- Assistive Technology, BADLS- Bristol Activities of Daily Living Scale, CES-D- Epidemiological Studies-Depression scale, MMSE- Mini-Mental State Examination, EQ-5D- EuroQol-5 Dimensions, QALYs- Quality-Adjusted Life Year, SUTAQ- Service User Technology Acceptability Questionnaire

term care homes diagnosed with dementia, while in 2021 the capacity increased to 12.8%[31]. Besides the long waiting time for a vacancy selection in the long-term care facility for some caregivers, there were also other factors influencing their decision regarding institutionalizing their family members with dementia as their emotional connection, experiences with healthcare providers not recommending institutionalization for their family member or financial challenges due to high cost of nursing homes services. The National Alliance for Caregiving (NAC) and the American Association of Retired Persons (AARP) Public Policy Institute, identified that caregivers of people with Alzheimer's disease or other related dementias support their daily activities and related complex care needs at the level of nursing skills. Becoming overwhelmed and experiencing significant stress may lead to a collective effect on a caregiver's mental and physical health and social and financial well-being with concomitant increases in expenses[30].

Beyond the associated health and social care costs that arise from the treatment of the condition, dementia also creates costs for businesses arising from workers who take care of people living with dementia. The Survey of adult carers in England from 2018/19 clarified that 20% of caregivers were still in some form of paid work (working full-time, part-time, or self-employed). The impact on businesses' cost by using the hours for undertaking care tasks. The outcome indicated spending an average of 7 hours per week, 51 million hours per year, in the conclusion of an output value of £654,9 million for 2019[32]. Successfully, AT and TM are becoming fundamental pillars of health strategies as promotion of autonomy and independence for people with dementia. Attending online healthcare services and using technology products can ease the burden of caregivers by helping them to reduce the caring effort, and minimize caregivers' time regarding traveling and scheduled appointments[33]. Online platforms can be a more cost-effective solution in the long term as an alternative contact with professional care personnel, enhancing the monitoring of disease progression, identifying emerging problems, and delivering professional interventions[34]. The findings of the cross-sectional survey from the United Kingdom showed a beneficial impact on caregivers' experiences of using AT due to dementia family member care. The most often chosen ATs were smartphones, and tablet computers, followed by video communication systems and dementia clocks. Smartphones and tablet computers were predominantly used because of the extensive options for communication, safety (tracking, medication reminders), and leisure activities. The outcome of their experience was that 62.7% would definitely or 31.3% probably recommend the use of AT to other carers[35].

Covid-19 has pushed society, to a new era of starting to use of technology-based interventions. As an urgent response to provide continuity of care and social connectedness, videoconferencing platforms such as Zoom and Skype have increased exponentially. Although the usability of ICT by people with dementia gained some popularity in the past two decades, the pandemic was a crucial period surging safe accession and reducing the risk of virus transmissions by avoiding exposure in healthcare facilities[36]. Norway researchers conducted a clinical trial of home-dwelling people with dementia regarding the pre-pandemic usability of assistive technology and explored if Covid-19 restrictions increased the interest in innovation. Their main finding indicated that AT was available to 71% out of 126 participants before the pandemic restrictions with general accessibility of traditional appliances such as safety alarms, stove guards, sensor technologies (GPS and fall detector), and medication adherence support. In response to Covid-19, 17% reported increased interest in utilizing AT[37]. Certainly, the pandemic forced acceleration in the current health system to start using TM to enable rehabilitation outside the traditional settings[30]. Likewise, a 4-week study conducted in Honk-Kong among patients with a diagnosed neurocognitive disorder showed overall benefits in the intervention group receiving telehealth through video conference (between March 2020 and mid-May 2020). Their suggestive finding was the ability to promote using video conferences in telehealth services not only in unusual circumstances of Covid-19 but also beyond the context of pandemic-related social distancing[39].

Due to the aging of the population and the increase in life expectancy, older people could become victims of the so-called digital divide, as the non-use of ICT could push them to the margins of modern society. From an economic point of view, the elderly could represent an opportunity for the economy, as they could become active users of ICT products and services that would meet their needs[18]. Silver economy is not defined as a separate sector but as a set of productive and commercial activities transversal to existing sectors (health, leisure activities, housing, insurance, caring sector, etc.)[40]. Technology based on dementia support and receiving telehealth intervention while using smartphone apps, wearables, computer programs, and e-learning could improve the resilience and well-being of both participants, people with dementia and their informal caregiver[24]. Remote transdisciplinary disease management will increase collaboration among serval stakeholders, including patient associations, health, informatics, and scientific societies. The outcome for patients with dementia may result in consistent cognitive improvement through carrying out household interventions to daily life activities as one of the most critical elements for the success of the intervention[31]. Older persons need to be introduced to telecommunications. The pandemic has highlighted the important role of TM in health care system. It is important to bring this way of using health services closer to people with dementia and their caregivers[39,40].

The advantages of this scientific review are the fact that this topic has been little studied, that the advisability of using TM in people with dementia have been evaluated by clinicians using standardized instruments, and at the same time an assessment of the experience with modern technology and their usefulness was given by people

with dementia after their use. The research gives us an insight into the possibilities of using modern technology by people with dementia in spite of their cognitive impairment and underline the possibility to support people with dementia who live at home by new technologies and what experiences and attitude regarding usefulness people with dementia have after use.

Limitation of the study includes the short time period (peer-reviewed literature published between 1/1/2020 and 23/3/2023), however the use of TM and ICT among people with dementia exponentially increased in time of Covid-19 pandemic (from 2020 to 2022). Other limitations were subjective perception of experience and usefulness regarding TM and AT, especially in people with cognitive impairment, relatively small numbers of studies and samples, results could not be generalized to all subpopulation of people with dementia, neither all people with dementia have access to TM and ICT. Another limitation of our study is the heterogeneity of studies, lack of methodological comparability (the use of different methods in studies included, use of different instruments/standardized questionnaires compiled and different type of TM applications and assistive devices or systems) with the lack of possibility to compare results from different studies, however status of dementia was clinically assessed in all studies, all questionnaires used in studies were standardized, in case of qualitative assessment (satisfaction, measure perceptions) Likert scales were used.

This research highlights the importance of using modern technologies in people with dementia, to stay in their home environment for longer, and for people with dementia to assess for themselves which technologies help them with regard to the disease. In the future, it is important to monitor progress in modern technologies, adapt them to people with dementia and carry out more research. Although modern technologies cannot replace persons, they can make an important contribution for people's life and their needs, the topic is of important interest in the field of anthropology.

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M. Lovrečič

National Institute of Public Health, Trubarjeva 2, 1000 Ljubljana, Slovenia
e-mail: Mercedes.lovrecic@nijz.si

TELEMEDICINA I ASISTIVNE TEHNOLOGIJE KAO PODRŠKA KUĆNOJ NJEZI OSOBA S DEMENCIJOM

S A Ž E T A K

Demencija ima dubok utjecaj na živote bolesnika, njihovu rodbinu i društvo. Osobe s demencijom s vremenom sve više ovise o pomoći drugih, stoga je važno podržati ih da budu što dulje neovisni kod kuće. Pregledali smo literaturu, korištenjem PRISMA metodologije, o korištenju telemedicine i asistivnih tehnologija kod osoba s demencijom koje žive kod kuće te kako su procijenili svoje iskustvo i primjenjivost novih tehnologija nakon njihove uporabe. Prema studijama koje su uključene u rezultate našeg istraživanja, osobe s demencijom sposobne su koristiti nove tehnologije, osobito ako su one prilagođene njihovim potrebama i ako su dizajnirane, razvijene oko i s korisnicima. Osobe s demencijom mogle bi ponuditi važne povratne informacije i procjene o korištenju suvremenih tehnologija.