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Facilitators and Barriers to the Adoption of Telehealth in Older Adults

An Integrative Review

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Telehealth offers a great opportunity to provide follow-up care and daily monitoring of older adults in their homes. Although there is a significant body of literature related to telehealth in regard to design and adoption, little attention has been given by researchers to the perceptions of the older-adult end users of telehealth. As the numbers of older adults increases, there is a need to evaluate the perceptions of this population as they will most likely be the major users of telehealth. This review identified the current telehealth technologies that are available to older adults with a discussion on the facilitators of and barriers to those technologies. Literature published between 2003 and 2013 was reviewed using MEDLINE, PsycINFO, and CINAHL. A total of 2387 references were retrieved, but only 14 studies met the inclusion criteria. This review indicates that 50% of the studies did not specifically address facilitators of and barriers to adopting telehealth with older adults. Also, studies in this population did not address caregivers' perceptions on the facilitators of and barriers to telehealth. The use of telehealth among older adults is expected to rise, but effective adoption will be successful if the patient's perspective is kept at the forefront.

KEY WORDS

Adult • Barriers • Facilitators • Older • Telehealth

Of the 57 million global deaths in 2008, 63% were due to four major chronic illnesses: cardiovascular diseases, diabetes, cancer, and chronic respiratory disease.[1] Chronic illnesses, although present in all age groups in society, are more common in older adults, persons older than 65 years. Currently, in the US, those 65 years or older compose 13.7% of the population.[2] However, as the elderly population grows, that percentage is expected to increase to 20% to 22% of the total US population by 2030.[3–5]

A significant percentage of the older adult populace experience at least one chronic illness that requires regular monitoring and some degree of self-management.[6] Self-management is the active process of sustaining health through symptom monitoring, treatment seeking and evaluating the effects of treatment.[7] To be efficacious, elderly persons must not only understand the condition, but also have the skills and attitudes to set goals, resolve problems, and monitor effects of treatment.[8]

Self-management involves patients making decisions about symptoms, after recognizing and interpreting symptoms, a task that may be daunting for some, especially older adults.[9] Older patients tend to have inferior knowledge of their disease, perform less self-management behaviors, and are less likely to recognize symptoms of exacerbation prior to hospitalization.[10] Symptoms are one of the most significant targets of therapy for adults experiencing chronic illness,[11] and appropriate interpretation of symptoms may help patients to better self-manage illness. Evolving technologies may provide the solution to this problem in that these systems can alert patients to monitor health status data that can assist in self-management at home.[6,12,13]

Even though there are a variety of telehealth technologies available to the chronically ill population, not all of those technologies may be utilized by the elderly. In addition to chronic illness symptoms, the elderly may experience alterations in vision, hearing, and dexterity, which may impede their use of various telehealth devices.[14,15] Telehealth is a term used to describe the use of telecommunication devices that allow for the synchronous or asynchronous exchange of healthcare information between geographically separated

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individuals.[12] Telehealth, by definition, is the use of various forms of communication technologies (television, e-mail, telephone, videoconferencing, Internet, radio) and the electronic exchange of healthcare information to provide long-distance clinical healthcare to patients.[16]

The use of telehealth is not new but has become more sophisticated over the last decade. These technologies are predominantly used by those with chronic illnesses, most of whom are in older-adult age groups.[5] For many telehealth systems in use, there has been overall success; however, these technologies have often been developed without assessing the usability for patients and caregivers.[17] In fact, most existing telehealth devices were developed and adopted without patient perspectives on the usability of the device.[18] Usability refers to the extent to which a device is perceived to be user-friendly or easy to use by a patient or caregiver.[16,18] Evaluating usability yields information on the desirable physical and/or psychological effects of technology on users,[19,20] which can facilitate the use of telehealth. For the purpose of this review, the term *facilitators* will be used to refer to those desirable effects. Barriers are those features present in either the older adult or the device itself that limits usability of the telehealth system for the patient. No previous review articles have described these aspects of telehealth.

Purpose

The purposes of this integrative review were to (1) describe current telehealth devices used to transmit physiological data in older adults with chronic illness and (2) evaluate facilitators of and barriers to telehealth technologies available to elderly patients with chronic physical disease. Two guiding questions provide structure to this integrative review:

1. What are the current telehealth devices that are used in older adults with chronic illness?
2. What are the facilitators and barriers to adoption of telehealth technologies in older adults with chronic physical disease?

METHODS

The Whittemore and Knafl[21] five-stage methodology was utilized to conduct the integrative review.

Problem Identification Stage

Multiple synonyms exist in the literature for telecommunication technologies; however, for the purpose of this integrative review, the term *telehealth* will be used to refer to all such technologies.

Literature Search Stage

The literature search was conducted using CINAHL, MEDLINE, and PsycINFO electronic databases using the search terms "(telecare OR telehomecare OR telemedicine OR telemonitoring OR telehealth OR physiologics AND usability OR problems AND elderly)." The inclusion criteria for the integrative review included (1) published between January 2003 and December 2013, (2) published in English, (3) research articles that used a telehealth device that transmitted physiological or symptom perception data, and (4) older adult population older than 65 years with a chronic illness. The timeframe was chosen for this review for a number of reasons including increased government support, patient and physician receptivity, and the rapid development and use of information technology in healthcare.[22,23] Devices that collected physiological measurements were included in this review to describe the array of available technology that can capture such data to enable patients to recognize early deterioration in their symptoms.

The integrative review includes literature on the available telehealth technologies for elderly patients with chronic illness. Article exclusion criteria include study titles and/or abstracts that did not include any of the search terms, systematic reviews, gray literature (ie, conference papers), and studies conducted with older adults who have mental illness, cognitive impairment, or live in a nursing home. Figure 1 displays the results of this search. A total of 2387 articles were found after exact duplicates were removed. Those articles were screened based on the inclusion criteria. Of those screened, only 39 met the inclusion criteria, and the full texts of those articles were then reviewed. Of the 39 reviewed, only 14 included interventions that communicated physiological data.

Data Evaluation Stage

The authors used published qualitative and quantitative guidelines to evaluate the methodological quality of the studies. The first author reviewed the quality of all studies, and the second author, who was blinded to the findings of the first author, independently evaluated the quality of 10% of the articles to ensure interrater reliability.

QUANTITATIVE STUDIES

To evaluate the quality of quantitative studies, the Downs and Black[24] instrument was utilized. The instrument is utilized with both randomized and nonrandomized studies, has good interrater reliability and validity, and is frequently used to evaluate a variety of quantitative study designs.[25] It has 27 items that yield an overall quality score between 0 and 31. Based on previously published cut points, articles with ratings greater than 20 were considered good, those at 20 considered fair, and those less than 20 were considered poor quality.

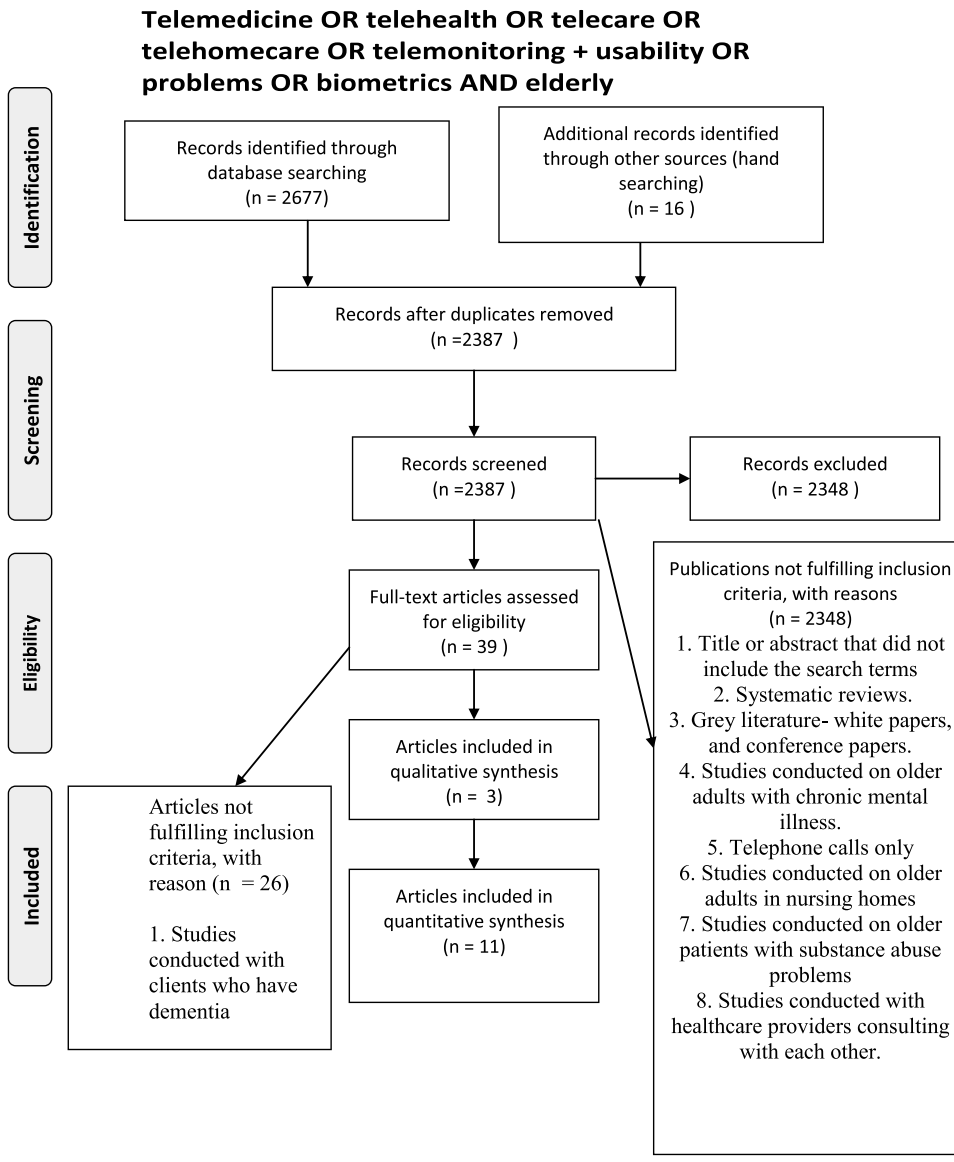

FIGURE 1. Article selection process.

QUALITATIVE STUDIES

To evaluate the quality of qualitative studies, a nine-item instrument that rates the title and abstract, introduction and aims, methods and data collection, sampling, data analysis, ethics and bias, results, transferability or generalizability, and implications and usefulness was used.[26] Each item is rated as good (4), fair (3), poor (2), or very poor (1), and total scores range from 9 (very poor) to 36 (good).[26,27] No studies were excluded based on the level of methodological rigor.

Data Analysis Stage

Data analysis was accomplished by summarizing the data in a matrix. Telehealth devices available to elderly patients with chronic illness along with a discussion of the facilitators of and barriers to those technologies identified in each article were extracted, compared, and contrasted across articles.

FINDINGS

A total of 14 studies were reviewed. Ten of the studies used quantitative methodologies including randomized controlled trials (n =6), pilot studies (n =1), and quasi-experimental methods (n =3). Three studies used a mixed-methods approach, and one study used qualitative methods with focus groups for data collection. Half of the studies were conducted outside the US (50%). The number of subjects included in the studies ranged from 4 to 2000 and included older adults with diagnoses of stroke, heart disease, diabetes mellitus, chronic obstructive pulmonary disease (COPD), and severe obstructive sleep apnea.

The overall quality of some of the reports is poor, as assessed by the two instruments chosen for use in this review.[24,26] The lack of rigor noted in some of the studies used in this review may limit external validity. Remarkable limitations included small samples, underpowered, single-site data collection, and lack of control groups. Also, some articles used quasi-experimental designs, which may have contributed to self-selection bias, thereby altering the results of these studies. For ease of reporting, telehealth devices described in this review were grouped into two categories: distant monitoring and mobile telephone communication devices.

Current Telehealth Devices Used for Older Adults With Chronic Illness

Currently, there are several telehealth devices used for older adults. Telehealth devices include one of several of these features: distant monitoring systems, which track the clinical condition of patients and convey data to healthcare professionals, and communication tools (ie, a mobile phone) to provide consultation or follow-up from a healthcare provider to the patient.[28]

A total of 12 studies described distant monitoring devices. Distant monitoring devices transmitted physiological health data to healthcare providers through secure Web-based databases. Communication to healthcare providers occurred via the Internet, telephones, or mobile phones. The CoaguChek device (Roche Diagnostics, Indianapolis, IN) is used to determine the international normalized ratios (INRs) of patients who are on warfarin. The device is similar to a glucose meter in that it requires a small droplet of blood from a fingerstick followed by the output of a numerical reading that the patient enters into a secure Web site on a personal computer.[29] Healthcare professionals respond to the patient via the secure Web site indicating the next warfarin dose.[29]

The multiuser telehealth kiosk system is located in an independent retirement community and allows residents to assess their blood pressure, heart rate, weight, pulse oximetry, and blood glucose after inserting a personal identification card in the system.[30] The card provides elders access to perform assessments and also to view their health information over time.[30] Collected health data are automatically transmitted to researchers.

The Health Buddy device (Bosch Healthcare, Palo Alto, CA) is an interactive communication device that can be programmed to present questions related to symptoms and information on its LCD screen. The device allows patients to respond by pressing one of four buttons on the front of the device.[31] The device is attached to a home telephone line that automatically dials a toll-free number to upload patient responses to a healthcare provider.[31,32]

The home telemonitoring (HTM) system is another transmission system that monitors the patient's weight, electrocardiogram (ECG), and vital signs. The device consists of an electronic weight scale, an automated sphygmomanometer, and a single-lead ECG with wristband electrodes to obtain a rhythm strip.[33] All three of the devices contain a short-range radiotransmitter that allows it to communicate with a hub connected to the patient's home telephone line, which then allows it to automatically connect to a central Web server in the healthcare provider's office.[33]

The American Telecare home telemedicine unit (American Telecare, Eden Prairie, MN) is a specially designed computer that connects to the Internet over home telephone lines. It is designed to support self-monitoring and uses electronic uploading of fingerstick glucose values, blood pressure readings, synchronous videoconferencing with a healthcare provider, e-mailing, and access to a Web site that allows the patients to review their physiological data and obtain educational material.[8] The system uses a four-button launch pad that also serves as a mouse pad. The patients can send their blood glucose and blood pressure results, access the Web, initiate a video chat, and/or restart the system by depressing a single color-coded large button.[8]

The photographic foot imaging device (PFID) is a tool to monitor patients with diabetes who are at high risk for ulceration. The PFID is composed of a camera module, light source, mirror, glass plate, foot supports, and a computer, all encased in a plastic frame.[34] Photographs of the feet are taken by the elder at home by pressing a remote switch connected to the device. The images are then transmitted over the Internet to a secure server in a provider's office.[34]

The autotitrating positive airway pressure (PAP) machine is another available telehealth device. A modem is attached to the device and transmits data across the telephone line on the patients' physiological information such as air leaks, adherence, and residual apnea-hypopnea index to a Web database for clinicians to review daily.[35]

A modified bathroom scale is another device that has been used to evaluate balance in the older adult population. The scale has four force sensors located at each of its corners to calculate the patient's body weight along with an infrared sensor that detects the presence of the patient on the scale.[36] A Bluetooth component provides communication between the scale and a mobile phone or personal computer and then to a remote server, where healthcare providers can analyze the data.[36]

Communication tools, described in two studies, include cell-phone applications or Web site links that allow patients to transmit physiological data to healthcare providers. Older adults have been asked to submit weight, blood pressure, heart rate, and current heart failure medication doses into the mobile phone's Internet browser, which is then transmitted to a monitoring center.[37] Using a secure Web site, a physician can access the information and contact the patient via the mobile phone.

Smartphone devices are being used with patients with type 2 diabetes. The phone is enabled to allow patients access to a daily Web-based diary where they can document

their eating behavior, medication taking, physical activities, and emotions.[38] The phone also has audio files containing mindfulness and relaxation exercises and a special application that allows for automatic transfer of the patient's blood glucose from the glucose meter.[38]

Facilitators of Telehealth Usability

Table 1 summarizes 14 studies that describe facilitators of usability for telehealth with older adults. The aims of seven of the studies (50%) did not specifically include the facilitators of using telehealth technologies. Of the remaining six articles, two were feasibility studies, and the other asked the patient his/her perspective as one of the aims of the study. This article provides a current review of the facilitators and barriers that need to be explored when planning on adopting telehealth for use with older adults.

Several factors aid in the acceptance of telehealth by older adults, such as (1) devices that use fewer buttons,[8] (2) automatic transmission of information,[8,31] (3) utilizing low-tech platforms (ie, telephone, TV),[36] (4) devices that generate reminders or alerts,[38] (5) providing both visual and audio guidance,[30] and (6) user-friendly images appropriate for the elderly.[30]

Barriers to Telehealth Usability

A number of barriers to the use of telehealth technologies were identified in the studies, such as (1) font size, unusual characters (difficult to read)[8,31,38]; (2) bland graphics and poor color contrast[3,37]; (3) using devices with widgets (older patients lack poor fine motor eye-hand coordination)[30]; (4) use of a computer mouse (difficult to use with arthritic hands)[8,30]; (5) unskilled on the use of a smartphone or a computer[32,37]; (6) multiple screen transitions to complete a task[8]; (7) menu bars that contain several layers[3,8]; and (8) inappropriate size of a smartphone (too big or too small; frail patients who have diminished grip strength may have problems handling the device).[31,38,40]

For older adults who are not accustomed to using technology, telehealth may also represent a cultural change,[31] something that has to be kept in mind when adopting telehealth. Lastly, delay in responses, lack of feedback, and technical problems can all lead to frustration and reduce motivation for patients to continue self-care monitoring activities.[32,38]

DISCUSSION AND IMPLICATIONS

This integrative review highlights the current telehealth devices reported in the literature for older adults with chronic illness. There are more than a half-dozen telehealth devices available for the older adult population. These devices can facilitate interaction between patients and healthcare providers[31] or enable the capture and transmission of physiological data.[8,33] Mobile phone devices are also being used to enable patients to input physiological data as well as to access applications and/or Web site links. Point-of-care devices are also being used. Although some of these devices have been around for many years, some of these systems are not ideal for older adults.[8]

This review also highlighted the facilitators and barriers to use of telehealth for older adults with chronic illness. Telehealth developers need to consider the visual-spatial, auditory, physical, and cognitive changes of the elderly, in addition to technical skills.[8] With the knowledge that both vision and hearing loss are common age-related conditions,[41] telehealth developers need to design devices that accommodate for those changes to ensure that patients can utilize the technology.

Clinicians need to consider the frailty level of patients when determining the appropriate telehealth applications for elders. Although not completely understood, frailty can negatively affect an elderly client's ability to utilize telehealth devices.[14] Further research that assesses the feasibility of different devices in different populations is warranted to assist clinicians with decision making. In the development of smart phone devices, care should be taken to ensure that elderly patients do not have to press several buttons to make choices when using a phone.[42] Healthcare providers and telehealth developers should work in teams to develop and test the efficacy of devices to ensure they meet the needs of the patients for whom they were developed.

Telehealth developers should also take into consideration that elderly patients may not be able to handle large volumes of material.[42] Therefore, devices should be designed to deliver information in small increments to allow for adequate processing. Also, some older adults become anxious and annoyed when trying to adjust their daily lives around telehealth devices.[13] Before setting up a device in a patient's home, healthcare providers should assess lifestyle habits and assist the patient to integrate the new technology. Overall, telehealth developers should recognize that devices should enhance an elderly person's quality of life, not impede it.[42]

The development of wearable devices that are smaller, less visible, and capable of measuring multiple physiological data properties simultaneously, with possible self-powering and wireless transmission of data, may make these devices more appealing.[17] As the older adult population continues to increase, they will more likely be the typical end user of telehealth systems; therefore, increasing the appeal of telehealth to this population will be important. In some instances, elders may have decreased cognitive, perceptual, and psychomotor abilities; therefore minimizing the barriers to telehealth may positively affect the acceptance of such technology.[30]

Table 1

Review of Studies in This Integrative Review

Author(s)/ Publication Date	Discipline of Author(s)	Purpose	Intervention, Research Design	Subjects	Facilitators	Barriers	Quality Score
LaFramboise et al,[31] 2003 US	Nursing	Determine the feasibility of providing a heart failure disease management program through an in-home telehealth communication device (Health Buddy) and compare the effectiveness of the Health Buddy with traditional home management strategies	Use of the Health Buddy vs traditional home management Quantitative: randomized controlled	90 Patients recently discharged from the hospital diagnosed with heart failure (N = 90)	The device displayed questions on its LCD screen Responders only had to use one of four buttons on the front of the device. Device attaches to a phone which automatically calls a toll-free number during the night to download participant responses via the Internet	Visual deficits, which made reading the LCD screen difficult No phone service available. No available outlets for the Health Buddy electrical cord; frailty (being too weak or ill) Cultural change that makes the technology less appealing	20/27[a]
Cleland et al,[33] 2005 UK, Germany, and the Netherlands	MD	Identify whether HTM improves outcomes compared with nurse telephone support and usual care for patients with heart failure who are at high risk of hospitalization or death	Use of HTM, vs nurse telephone support vs usual care Quantitative: randomized controlled	Patients with recent admission for heart failure and LVEF <40% (N = 426)	Although many patients were elderly, their acceptance and ability to cope with the HTM technology were high	Poorly designed devices that do not facilitate communication and data processing to support decisions	24/27[a]
Kaufman et al,[8] 2006 US	MD, public health, informatics	To develop and refine a theoretical framework that supports a set of design principles for developing effective applications that are usable by older adults	Usability evaluation research related to a large-scale telemedicine project (IDEATel) Evaluation research	Medicare beneficiaries living in medically underserved areas (N = 2000)	Four-button launch pad (also used as a mouse pad) in which the patient could initiate a video visit, send their blood pressure and glucose results, access the Web (for biometric review or educational materials), or restart the system with a single touch of a large, color-coded button	Font size, space between links, size of buttons, and the use of widgets; the need to use fine eye-hand coordination to access widgets Too many actions to perform a command, eg, sending an e-mail requiring 13 actions	30/36[b]

(continues)

Table 1

Review of Studies in This Integrative Review, Continued

Author(s)/ Publication Date	Discipline of Author(s)	Purpose	Intervention, Research Design	Subjects	Facilitators	Barriers	Quality Score
Bendixen,[32] 2006 US	Rehabilitation science	To explore differences in health-related outcomes and costs between (1) veterans enrolled in a telerehabilitation intervention, (2) veterans enrolled in a telehomecare intervention, and (3) veterans who receive VA standard care without a telehomecare or telerehabilitation intervention	Use of videophone, Health Buddy and AVIVA Mixed methods	Veterans with multiple comorbidities (N = 227)	Videophone: standalone device that connects to a regular telephone line and allows video and audio input between the veteran and healthcare provider. Health Buddy: in-home messaging device that presents veterans with questions on an LCD screen. Responders had to use only one of four buttons on the front of the device. Patient data are sent via telephone to a data center. AVIVA home telecare system: live PC-based monitoring with two-way video	Delay in response to videophone calls Lack of feedback based on responses inputted into Health Buddy Difficulty learning to use the computer	36/36[b]
Scherr et al,[37] 2009 Austria	MD, informaticists	To evaluate the impact of home-based telemonitoring using Internet and mobile phone technology on the outcome of heart failure patients	Use of a mobile phone for data acquisition and data transmission Prospective, randomized, open- label study	Mean age, 66 y (N = 120), heart failure	An easy-to-use patient terminal to allow safe and secure data acquisition	Patients' unfamiliarity on how to navigate a mobile phone	20/27[a]
Duchene and Hewson,[36] 2011 France	Engineering	Investigate the usability and acceptability of the device (modified bathroom scale) to elderly users	Use of a bathroom scale to acquire data from the weight sensors and transmit via mobile phone Longitudinal evaluation, mixed method	Mean age, 77 y (N = 22) Chronic illness status of patients not mentioned	Not a concern due to the very simple utilization procedure	Need to weigh every day Telecommunication problems between the cell phone and the remote server	24/36[b]

(continues)

Table 1

Review of Studies in This Integrative Review, Continued

Author(s)/ Publication Date	Discipline of Author(s)	Purpose	Intervention, Research Design	Subjects	Facilitators	Barriers	Quality Score
Christensen et al,[29] 2011 Denmark	MD	Investigate if the weekly measurement and dosing of INR at home using the online Internet-based system was superior to conventional treatment	Use of a computer system to control anticoagulation therapy Randomized controlled trial	Patients from an anticoagulation clinic aged 21–86 y (N = 140); atrial fibrillation, cardiac aneurysms, antiphospholipid syndrome, cardiomyopathy, DVT/PE, factors II and V mutation, ischemic heart disease, prosthetic heart valves, mitral stenosis, cerebral infarct/ cerebral ischemia	More engaged, knowledgeable, computer literate, and, in general, better health	No Internet access	18/27[a]
Nes et al,[38] 2012 Norway	Nursing, MD	Develop and test the feasibility of a 3-mo Web-based intervention, delivered by a smartphone to support self-management in patients with type 2 diabetes	Use of a smartphone to transfer blood glucose level, using online diaries and receiving situational feedback Pilot study	Patients from general practitioner offices were invited to participate N = 15 aged 46–71 y; type 2 diabetes	Meaningfulness, easy, useful, adequate support	Smartphone: touch display (unusual, illogical with small letters) and the size of the phone (too big); technical problems	33/36[b]
Radhakrishnan et al,[13] 2012 US	Nursing	Exploration of perceived barriers and benefits of telehealth for heart failure	Use of telehealth equipment (automated blood pressure, pulse oximeter) Mixed method	Visiting nursing agency patients N = 4 aged 85 or older	Equipment user-friendliness, fear of hospitalization, caregiver support, physician buy-in	Equipment malfunction, caregiver opposition, lack of perceived usefulness, preference for in-person assessment, physical fragility, physician unfamiliarity with telehealth	32/36[b]

(continues)

Table 1

Review of Studies in This Integrative Review, Continued

Author(s)/ Publication Date	Discipline of Author(s)	Purpose	Intervention, Research Design	Subjects	Facilitators	Barriers	Quality Score
Takahashi et al,[39] 2012 US	MD	Telemedicine would reduce hospitalizations and ED visits compared with usual care	Use of the Intel-GE telemonitoring device in patients who are at high risk for hospitalization or ED visits Randomized controlled	Patients who were enrolled in the Employee and Community Health program primary care panel, whose Elder Risk Assessment Index exceeded 15 (N = 205), mean age 80.3 y; stroke, diabetes, heart disease, COPD			21/27[a]
Hazenberg et al,[34] 2012 The Netherlands	MD	Demonstrate the feasibility of using the PFID for the diagnosis of foot disease in the home of high-risk patients with diabetes	Use of a PFID as a telemonitoring tool Prospective monitoring study	Patients from an outpatient diabetic clinic; mean age, 60 (SD, 11) y; mean duration of diabetes, 18 (SD, 12) y (N = 22)	Time saving, expense reductions, feeling safer using the device Less dependent on family/friends for help with the device	Unclear instructions on how to operate the device Lack of timely support with technical problems	29/36[b]
Fox et al,[35] 2012 Canada	MD, RT, computer science	Determine whether PAP adherence can be improved with a telemedicine monitoring system	Comparison of standard PAP vs PAP by telemedicine Randomized controlled study, nonblinded	Mean age, 53.5 (SD, 11.2) y (N = 75); severe obstructive sleep apnea	Motivational support offered to patients	Delayed attention to problems	16/27[a]
Demiris et al,[30] 2013 US	Nursing, biomedical and health informatics	Evaluate the perceived usability and effectiveness of a telehealth wellness kiosk in an independent retirement community as well as privacy consideration	Use of a telehealth kiosk system implemented within an independent retirement community setting Qualitative: focus group sessions	Older adults in a retirement community; average age, 79.3 y (N = 12); disease types are not specified	Feedback along the way via the device or other modalities indicating whether patient is doing better or worse in managing his/her disease Utilizing images that the target population is familiar with	Frustrations with the computer mouse, difficulty due to arthritis in their hands when trying to manipulate the mouse correctly, the audio component of the software presented a challenge for some with hearing impairment. Hard to recall instructions on use of the software. Software did not allow subjects to skip a task, which led to some participants feeling trapped	32/36[b]

(continues)

Table 1

Review of Studies in This Integrative Review, Continued

Author(s)/ Publication Date	Discipline of Author(s)	Purpose	Intervention, Research Design	Subjects	Facilitators	Barriers	Quality Score
Upatising et al,[40] 2013 US	MD	Evaluate the effectiveness of HTM in reducing the decline of worsening frailty states in older adults aged ≥60 y with comorbid health problems	Use of the Intel-Health Guide HTM vs usual care Secondary analysis of a quantitative: randomized controlled	Outpatients from four sites who have multiple chronic conditions (stroke, heart disease, diabetes mellitus, and COPD); age, >60 (N = 205)	This study did not look at facilitators of telehealth	Frailty status	18/27[a]

Abbreviations: DVT, deep vein thrombosis; LVEF, left ventricular ejection fraction; PE, pulmonary embolism.
[a]Based on 0–27 quality rating score.[24]
[b]Based on 0–36 quality rating score.[26]

One noted gap in the literature search is research on the caregiver's perspective in regard to telehealth technologies available for patients who do not have dementia. This area is noteworthy, and future research should assess the needs of this population, given the projected rise in the older adult population as well as the increase in the use of familial caregivers for daily assistance with self-management.

CONCLUSION

This integrative review revealed that there are factors, from the older adult's perspective, that can either facilitate or serve as barriers to adopting telehealth. It is evident that with the growing demographics of older adults issues related to visual-spatial, auditory, physical, and mental changes will impact this population. Therefore, the developers, implementers, and adopters of telehealth should be mindful of these issues when working with the older adult population. Importantly, the results of this review support the need for researchers to involve the end users, both the patient and caregiver, in the development of devices.

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