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Review

eHealth Technologies in Transitional Care Interventions for Stroke Survivors and Caregivers: A Scoping Review

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Abstract

The high rate of stroke disability necessitates extensive care during transitions between hospitals and homes. While many transitional care interventions have emerged, no explicit evidence illustrates the details of those combining or integrating eHealth. The aim of this scoping review was to comprehensively map the literature on eHealth technologies within transitional care interventions for stroke survivors and their caregivers. Studies were included if they focused on transitional care interventions that combined or integrated eHealth technologies for adult and elderly survivors of post-hyperacute stroke, as well as for caregivers aged 18 years and older. A systematic search was conducted from inception to August 2024 across eleven electronic databases, including PubMed, Embase, CINAHL, MEDLINE, Cochrane Central Register of Control Trials, Web of Science, APA PsychInfo, SCOPUS, MedNar, ProQuest Dissertations and Theses Global, and Google Scholar, with a focus on quantitative studies. Data were extracted using customized forms, categorizing study characteristics. Basic descriptive qualitative content analysis was employed for coding and classifying interventions, with results presented in a diagram, narrative summaries, and tables. Results from 4032 identified records yielded 42 eligible studies. Transitional care's components included health education and psychoeducation, skill training, exercises for physical rehabilitation, psychological or resource support, and follow-up care. eHealth technologies were categorized into six types, with eleven specific features. Outcomes were classified into six domains for stroke survivors and five for caregivers. These findings can inform the key components of a transitional care intervention incorporating suitable eHealth technology for stroke survivors and their caregivers, delivered by a multidisciplinary team.

Keywords: Care transitions, cerebrovascular disease, hospital to home, mHealth, telehealth

Introduction

Stroke remains a leading cause of global morbidity and is the second most common cause of mortality. Over the past 17 years, the lifetime risk of stroke has risen to one in four people. Since 1990, stroke prevalence has increased by 102% worldwide, with a 143% rise in Disability-Adjusted Life Years. Approximately 101 million people globally live with stroke, with 89% of deaths and disabilities occurring in low-to-middle-income countries (Feigin et al., 2022). Many stroke survivors are rapidly discharged from the hospital, often with residual disabilities, due to efforts to reduce healthcare costs and accommodate waiting patients. They frequently experience physical, emotional, and cognitive impairments, in which caregivers often struggle to meet their complex care needs (Kamalakannan et al., 2023). Adequate hospital discharge preparation and ongoing home care are essential for both groups.

The transition from hospital to home can be a vulnerable time for stroke survivors and their caregivers. Transitional care is a crucial part of patients' services during their changes from one level of care or one type of setting to another, in which those services aim to provide continuing care with safe and timely transfer and prevent poor outcomes for people at risk (Naylor & Keating, 2008). Accordingly, a previous systematic review showed that numerous transitional care interventions were developed to prevent negative stroke outcomes. The interventions were initiated in hospitals and/or communities, and some commenced at inpatient rehabilitation units with various key strategies such as stroke education, psychoeducation, health coaching, skills, and exercise training. Traditionally, these interventions have been delivered through in-person sessions, phone calls, letters, and home visits, which have been shown to improve key outcomes for both patients and caregivers (O'Callaghan et al., 2022).

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There has been a growing number of transitional care trials that combine or integrate interventions with new strategies, such as eHealth technologies, for patients with various chronic diseases and their caregivers (Renzi et al., 2022). eHealth refers to the use of information and communication technologies to support a range of health-related services, such as medical services, health research, and health education (World Health Organization [WHO], 2016). eHealth has become a crucial part of healthcare systems, promoting universal coverage, especially in countries with limited community support services after hospital discharge. Its use among patients with chronic diseases has shown improvements in self-care, self-efficacy, knowledge, quality of life, and clinical outcomes such as blood pressure, cholesterol, blood sugar, and hospital admissions (Renzi et al., 2022). Additionally, previous studies demonstrated users' positive perceptions of the benefits of eHealth technologies when integrated into interventions (Einerson et al., 2022; Zhang et al., 2020). This provides strong evidence of a positive trend in integrating or combining eHealth into interventions to enhance the efficiency of future transitional care.

It is interesting to note that eHealth technologies, such as mobile health (mHealth) or mobile applications, are relatively new in stroke care (Chin et al., 2022). Most stroke care research has applied eHealth for patient rehabilitation, particularly for improving physical function. Some eHealth interventions have been reviewed only for specific domains of stroke recovery, focusing on either physical (Nikolaev et al., 2022) or psychological (Chin et al., 2022) aspects. Certain eHealth programs are tailored for mild to moderate stroke disabilities, which may not be suitable for all stroke survivors (Nikolaev et al., 2022). Researchers have primarily reviewed specific issues related to eHealth technologies, such as types of mobile or web applications and their content (Lobo et al., 2021). Notably, there have been heterogeneous interventions that combined eHealth technologies (Elsheikh et al., 2022; Li et al., 2024; Vloothuis et al., 2019). Although a recent rapid review presented the content of technologies applied to stroke caregiving (Lobo et al., 2022), it lacked details about the components of various interventions and did not specifically examine transitional care. Moreover, previous review studies have not yet investigated the evidence of transitional care interventions using eHealth technologies for stroke survivors and caregivers.

In conclusion, there is a lack of systematically reviewed evidence on the characteristics of transitional care interventions and eHealth technologies applied for stroke survivors and their caregivers. Therefore, the aim of this scoping review is to systematically identify and map the available literature on eHealth technologies in transitional care interventions for both stroke survivors and caregivers. This scoping review can benefit healthcare providers and researchers by offering a broad overview of the evidence to inform future practices, as well as the design and development of post-stroke care interventions.

Review Questions

1. What transitional care interventions with eHealth technologies are available to stroke survivors and caregivers?
2. What components of transitional care interventions have previous studies applied to stroke survivors and caregivers?
3. What types and features of eHealth technologies are combined or integrated with these transitional care interventions for stroke survivors and caregivers?
4. What outcomes have been reported in studies testing transitional care interventions combined or integrated with eHealth technologies for stroke survivors and caregivers?
5. What transitional care interventions have been designed and tested specifically for elderly stroke people and their caregivers?

Methods

Study Design

This study was a scoping review. The scoping review protocol was registered on the Open Science Framework (https://idm.in/0i7jSyo; registration DOI: https://doi.org/10.17605/OSF.IO/N3X6A). It was conducted following the Joanna Briggs Institute (JBI) methodology and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). Supplemental tables and figures are available online.

Eligibility Criteria

The eligibility criteria were based on the participants, concept, and context framework, and specific characteristics of studies.

1) *Participants*

The review included adult and/or elderly survivors (≥60 years) post-hyperacute stroke (>24 hours after onset), either pre- or post-hospital discharge, with ischemic or hemorrhagic strokes, as well as stroke family caregivers aged 18 and older.

2) *Concept*

Transitional care is defined as:

A broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level of care to another or from one type of setting to another (Naylor & Keating, 2008, p. 58).

The focus was on transitional care between hospital or inpatient rehabilitation and home, aimed at stroke recovery and significant for continuing care. The WHO (2016, p. 11) defines eHealth as "the cost-effective and secure use of information and communications technologies in support of health and health-related fields, include health-care services, health surveillance, health literature, and health education, knowledge and research." Examples of eHealth technologies applicable in interventions include telehealth, telerehabilitation, mHealth applications, and videoconferencing, which can be utilized before and/or after discharge. Thus, studies will be eligible if they focus on transitional care interventions using eHealth technologies and detail the interventions and the outcomes examined.

1) *Context*

Transitional care interventions using eHealth technologies occur during post-stroke recovery, specifically at hospital discharge and/or follow-up care.

2) *Types of sources*
The review included quantitative studies, as well as pilot and feasibility studies, mixed methods, and qualitative studies relevant to the review questions. It excluded all types of reviews, study protocols, and conference abstracts, while including published and unpublished English-language articles from inception to the present day.

Study Process
Eleven electronic databases were searched, including PubMed, Embase, CINAHL (EBSCOhost), MEDLINE (Ovid), Cochrane Central Register of Control Trials, Web of Science, APA PsychInfo, SCOPUS, MedNar, ProQuest Dissertations and Theses Global, and extended to a search from Google Scholar. Both published and unpublished English-language articles were searched from inception to March 2023, with updates conducted in August 2024.

A preliminary search was conducted in PubMed to identify articles relevant to the review topic.

Text words from the article titles and abstracts were then retrieved as keywords for a full search. Medical Subject Headings (MeSH) terms related to transitional care, eHealth technology, stroke survivors, and caregivers were searched in the MeSH database (National Library of Medicine). A full search strategy was developed using the identified MeSH terms and keywords, incorporating Boolean operators "AND" and "OR," as well as applying truncation, quotes, and field tags where applicable to the databases. Each search was modified and applied to other databases.

Selection of Sources of Evidence
All citations from the search databases were imported into EndNote v.20 (Clarivate Analytics, PA, USA) to eliminate duplicates. Two independent reviewers (O.L. and C.K.) screened titles and abstracts for relevance based on the eligibility criteria. The selected full-text articles were then assessed in detail by the same reviewers. Any disagreements were resolved through discussion, or the third reviewer (J.M.L.) was consulted if necessary. The results of the search, the study inclusion process, and the reasons for exclusion are illustrated in a PRISMA flow diagram (Figure 1).

Data Charting Process
Data from the selected articles were extracted by two independent reviewers (O.L. and C.K.) using the customized data extraction forms developed by the reviewers. These forms were piloted independently on the first three studies. Data were consistently extracted according to the review questions, covering study characteristics, population details, transitional care interventions, eHealth technologies, and outcomes. An additional form was created to specifically map evidence for transitional care interventions and eHealth technologies for elderly stroke patients. Any disagreements between reviewers were resolved through discussion, or with the help of the third reviewer (J.M.L.) if necessary.

Data Items
The reviewers abstracted data on study and population characteristics, study frameworks, transitional care interventions' characteristics (i.e., types and components of transitional care interventions, types and features of eHealth, intervention providers), outcomes, and outcome measures.

Synthesis of Results
The characteristics of the included studies were presented in categories. Descriptive qualitative content analysis was used to classify interventions into transitional care categories. Results

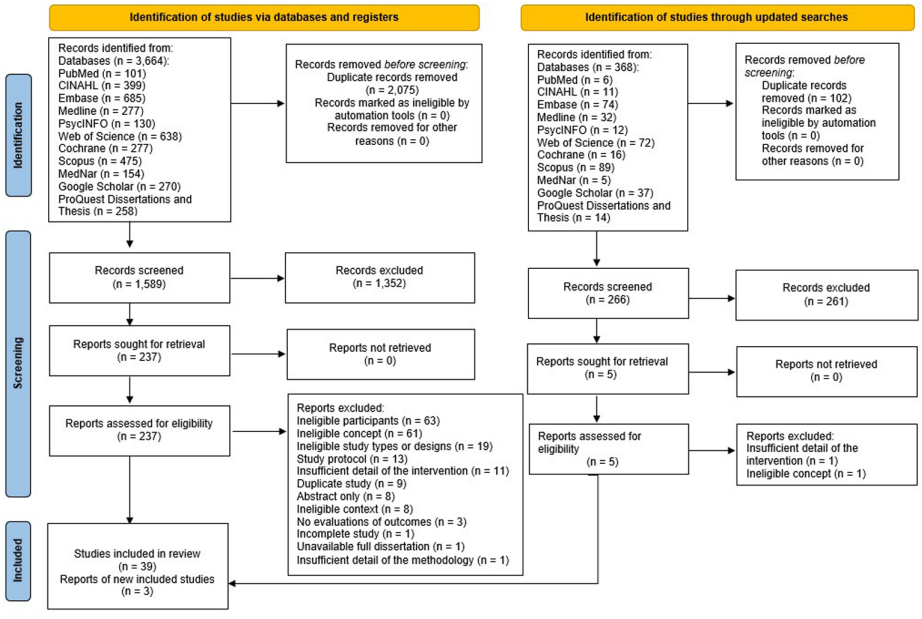

Figure 1.
Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram for the Scoping Review Process.

were summarized narratively and presented in tabular format in alignment with the review objectives and questions.

Results

Selection of Sources of Evidence

In the first search conducted in March 2023, a total of 3664 articles were identified, followed by 368 articles in the updated search in August 2024, before removing duplicates. For full-text screening, 242 articles from both searches were assessed for eligibility, resulting in the inclusion of 42 studies in this scoping review (Figure 1).

Characteristics of Sources of Evidence

Among the 42 included studies, 22 were conducted in Asia, including China (n = 12), Taiwan (n = 1), Thailand (n = 1), Malaysia (n = 1), India (n = 1), South Korea (n = 1), Pakistan (n = 1), and Iran (n = 4). The remaining 20 studies were from Europe (n = 7: Türkey, Germany, Italy, and the Netherlands), America (n = 11: USA, Canada, and Colombia), Africa (n = 1, Egypt), and Australia (n = 1). These studies were published between 2002 and 2024. Regarding study types, there were 24 randomized controlled trials (RCTs) (56.41%), nine pilot or feasibility studies (23.08%), and nine other experimental and quantitative designs (20.51%). Participant numbers ranged from 16 to 155 per group for RCTs and other experimental studies, from 30 to 234 for quantitative studies, and from 10 to 32 for pilot studies (Table 1). The majority of stroke patients were men, with average ages ranging from 49.75 (SD ± 11.51) to 75.40 (SD ± 9.30) years. For caregivers, their average ages ranged from 35.48 (SD ± 10.77) to 56.00 (±11.30) years (Supplementary Table 1).

Study Frameworks

Of the 42 total included studies, 17 reported using various theories, frameworks, and models to explain intervention principles, frame the intervention components, and guide the intervention implementation and evaluation. They were synthesized into five categories: 1) Nursing and Health-Related Models/Theories (Transitional Care Model, Self-Efficacy Theory, Lorig & Holman's Self-Management Theory, Double ABC-X Model, Social Problem-Solving Theory, Chronic Care Model, Collaborative Remote Rehabilitation Nursing Model, Information-Motivation-Behavioral Skills Model); 2) Occupational Therapy and Rehabilitation Models/Theories (Cognitive Orientation to the Occupational Performance Model, Motor Relearning Theory); 3) Service Delivery Models (Hospital Community-Integrated Service Model, Task-Shifting Model); 4) Education and Learning Models/Theories (Adult Learning Theory, Training-the-Trainer Model); and 5) Process Guidance Frameworks/Models (Medical Research Council Framework, Obesity-Related Behavioral Intervention Trials Model, Assessment-Intervention-Evaluation Omaha System) (Table 2).

Transitional Care Interventions

Of the 42 included studies, 39 reported transitional care interventions that were not specific to elderly stroke survivors. The synthesis identified five key components of the interventions (Table 3): 1) health education and psychoeducation (stroke-related knowledge, self-care, rehabilitation); 2) skills training for caregivers or stroke patients (problem-solving, caregiving, rehabilitating); 3) exercises or physical rehabilitation for patients; 4) psychological, emotional, or resource support; and 5) follow-up care (home visits, telephone calls, video visits, telemonitoring) (Table 3).

Additionally, 33 studies primarily focused on components for patients, with most interventions designed to teach and train caregivers to care for stroke patients. While two studies specifically aimed to support caregivers, five studies addressed components of the interventions for both patients and caregivers. Only two studies featured dyadic interventions which incorporated education and mental health support. One of these studies contained intervention content exclusively relevant to post-stroke patient care without evaluating caregivers' outcomes, while the other assessed only caregivers' outcomes (Tables 3 and 6).

eHealth Technologies

The synthesis of the transitional care interventions reveals the use of several eHealth technologies, which were classified into six categories (Table 3): 1) telephone/mobile phone, 2) smartphone/tablet application, 3) telerehabilitation/telemedicine, 4) web-based application, 5) internet website, and 6) Digital Versatile Dise (DVD). It is evident that most studies utilized telephone or mobile phone and smartphone applications as common eHealth technologies (Table 3).

The features or functions of eHealth were classified into 11 categories: 1) telephone calls/counseling, 2) text messages via phone or email, 3) video/virtual conferences (e.g., remote conferences, remote counseling, remote exercise), 4) video/3D video for education, 5) online chat, 6) gameplay/virtual therapeutic games, 7) exercise guides on apps, 8) webpages/online resource links/internet forums, 9) web-based portals, 10) electronic health records, and 11) telemonitoring. However, four main features were most commonly used: 1) telephone calls/counseling, 2) video/virtual conferences, 3) video/3D video for education, and 4) online chat or text messages (Table 3).

Intervention Providers

Intervention providers primarily included healthcare professionals, researchers, and participants themselves, depending on the types and components of the transitional care interventions. Most interventions were delivered by nurses (21 studies, 50%), followed by therapists such as physical, occupational, and speech-language therapists (12 studies, 28.57%). Six studies (14.28%) identified a multidisciplinary team—including neurophysicians, physicians, stroke nurses, nurse practitioners, dietitians, physiotherapists, occupational therapists, pharmacists, speech-language pathologists, and social workers—collaborating on various intervention components. Some studies involved caregivers delivering interventions based on provided materials, allowing patients to perform self-practice. Additionally, two studies included neurologists or neurosurgeons (Li et al., 2024; Zhang et al., 2020) as providers, while one study featured social workers acting as case managers (Reeves et al., 2019) (Table 3).

Outcomes and Outcome Measures

This scoping review emphasizes intervention outcomes while excluding feasibility and acceptability results from the selected

Table 1.
Overall Characteristics of Sources of Evidence (n = 42)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Aphiphaksakul & Siriphorn (2022)/ Thailand	Determine the effects of home-based exercise utilizing a balance disc.	*n* = 16 (I) *n* = 16 (C)	N/A	Single-blind, parallel-group RCT	Home-based exercises	Balance, activity of daily living (ADL)	Patients: Significant improvement of the outcomes.
Bakas et al. (2015)/USA	Evaluate the efficacy of the telephone assessment and skill-building kit.	*n* = 121 (I) *n* = 130 (C)	*n* = 123 (I) *n* = 131 (C)	Prospective RCT	Telephone assessment and skill-building kit	Depressive symptoms, life changes, unhealthy days	Caregivers: - Greater reduction in depressive symptoms and greater improvement in life changes. - Relatively greater reduction in unhealthy days.
Bavarsad et al. (2022)/Iran	Determine the effects of a Transitional Care Model program.	*n* = 40 (I) *n* = 40 (C)	N/A	Non-RCT	Transitional Care Model program	Quality of life (QoL), ADL	Patients: QoL and ADL mean scores were significantly different between groups, and greater than the control group.
Baykal & Tülek (2022)/Türkey	Evaluate the effects of discharge training.	*n* = 20 (I_1) *n* = 19 (I_2) *n* = 20 (C)	*n* = 20 (I_1) *n* = 19 (I_2) *n* = 20 (C)	Three-arm RCT	Discharge training	QoL, self-efficacy, reintegration	Patients: - Significant improvement of QoL. Caregivers: - QoL and self-efficacy improved or maintained by the intervention.
Bernocchi et al. (2015)/Italy	Evaluate the feasibility and efficacy of an in-hospital rehabilitation.	*n* = 15 (subacute) *n* = 11 (chronic)	N/A	Feasibility study	Home-based telesurveillance and rehabilitation	Functional recovery, depression, family strain	Patients: - Feasible and effective in both sub-acute and chronic stroke. - Improved their recovery and maintain the benefits reached during inpatient rehabilitation.
Bitek & Erol (2023)/Türkey	Determine the effect of discharge training and telephone counselling service.	*n* = 34 (I) *n* = 35 (C)	*n* = 34 (I) *n* = 35 (C)	RCT	Discharge training and telephone counselling	Functional status, burden	Patients: - Disability score at 3 months was significantly lower than the control group. - ADL score at 3 months was significantly higher than before discharge. Caregivers: - Burden was significantly lower than the control group at 3 months.
Chu et al. (2020)/ China	Evaluate the feasibility of a novel, nurse-trained, family member-delivered rehabilitation model.	*n* = 31 (I) *n* = 30 (C)	N/A	Single-center RCT	Nurse-trained, family member-delivered rehabilitation	Functional independence, health-related QoL, burden	Patients: - Functional independence scores had increased more at 3 months and decreased less at 6 months. At 3- and 6-month post-discharge were higher than before discharge. The scores showed a significant difference across the three time points. Caregivers: - Both groups had similar health-related QoL and burden scores.

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Demir Avci & Gozum (2023)/ Türkey	Examine the effects of a Transitional Care Model program.	*n* = 33 (I) *n* = 30 (C)	*n* = 33 (I) *n* = 30 (C)	Parallel-group, assessor blinded monocenter RCT	Transitional care program	Readmissions, pressure ulcers, competence levels, preparedness, eHealth literacy, burnout	Caregivers: - Better competence, preparation for care, and eHealth literacy. - Decrease in personal accomplishment.
Deutschbein et al. (2020)/Germany	Evaluate the effectiveness of a post-stroke care coordination program.	*n* = 60 (I) *n* = 31 (C)	N/A	Pragmatic non-RCT	Care coordination program	Health service utilization, recurrences, readmission, accompanying costs	Patients: - Had seen an outpatient neurologist more often and were less frequently readmitted. - Lower hospital costs than the control group.
Edwards et al. (2023)/USA	Examine the feasibility, safety, and efficacy of a telerehabilitation program.	*n* = 16	N/A	Prospective, dual-site, single-arm repeated measures	Telerehabilitation	Feasibility, safety, motor & cognitive functions	- It illustrated the safety, feasibility, and favorable rating over and above usual rehabilitation. - It effectively transited to the home environment, where patients continued with high compliance and satisfaction.
Einerson et al. (2022)/USA	Assess the feasibility and acceptability of a remote goal-based education and skills training program.	*n* = 28	*n* = 28	Single-arm, mixed-methods pilot study	Goal-based education and skills training program	Feasibility & acceptability	Caregivers: - Reported high satisfaction, and >75% reported content was at least quite helpful. - Length of the program was appropriate and weekly check-ins were helpful.
Elsheikh et al. (2022)/Egypt	Evaluate the effectiveness of a tailored multidimensional intervention.	*n* = 55 (I) *n* = 55 (C)	*n* = 55 (I) *n* = 55 (C)	Prospective RCT	Tailored multidimensional intervention	Burden, QoL	Caregivers: - No significant differences between groups, or effect on the outcomes between or within the groups over time.
Feng et al. (2021)/ China	Explore the effect of the hospital community-integrated service model.	*n* = 60 (I) *n* = 60 (C)	N/A	RCT	Hospital-community integrated service model	Self-care, compliance, self-efficacy, mood	Patients: - Self-care and self-efficacy scores after 3 months were higher than the control group. - Mood scores were lower than the control group after 3 months.
Grant et al. (2002)/ USA	Quantify the impact of social problem-solving telephone partnerships.	*n* = 74	*n* = 74	Randomized 3-group repeated-measures	Problem-solving skill training	General health, problem-solving skills, satisfaction with service, depression, preparedness, burden	Caregivers: - Telephone partnership group had better problem-solving skills, greater preparedness, less depression, and significant improvement in general health.

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Kang & Li (2022)/ China	Assess the impact of the WeChat-based caregiver education program.	*n* = 86 (I) *n* = 84 (C)	*n* = 86 (I) *n* = 84 (C)	RCT	Caregiver education program	Satisfaction, cognitive impairment, depression	- Improved satisfaction (patients & caregivers). - Mitigated cognitive impairment and depression (patients).
Kamal et al. (2020)/Pakistan	Evaluate the effectiveness and safety of 5-minute movies for education.	*n* = 155 (I) *n* = 155 (C)	*n* = 155 (I) *n* = 136 (C)	RCT, outcome assessor-blinded	Stroke caregiver dyad education	BP, blood tests, post-discharge mortality, functional disability	Patients: - No differences between groups for BP & blood tests. - Mortality was lower and better functional improvement than the control group at 12 months.
Kamalakannan et al. (2023)/India	Identify operational issues, finalize, and assess the feasibility and acceptability of ReWin intervention.	*n* = 10 (phase I) *n* = 30 (phase II)		Mixed-methods, feasibility and acceptability study	Digital therapeutic rehabilitation	Operational issues, feasibility, acceptability	- It was feasible and acceptable. - Operational difficulties: therapeutic content, format, navigation, connectivity, video-streaming, language, and comprehensibility of the animated content.
Kim et al. (2012)/ South Korea	Develop a program and verify its effectiveness.	*n* = 42 (I) *n* = 31 (C)	*n* = 42 (I) *n* = 31 (C)	Quasi-experimental design	Home-based education and support	ADL, health sate of family, social support, burden	Caregivers: - Burden score was significantly lower than the control group, and had a significant difference between pre- and post-intervention.
Li et al. (2024)/ China	Investigate the impact of an internet + WeChat platform-based "trinity" remote rehabilitation.	*n* = 80 (I) *n* = 79 (C)	N/A	RCT	Remote rehabilitation nursing intervention	Limb function, ADL, compliance of rehabilitation nursing	Patients: - At 3, 6, and 12 months after the intervention, the limb function and ADL scores of the experimental group were higher than those of the control group.
Lin et al. (2022)/ China	Evaluate the effects of a nurse-led health coaching program.	*n* = 70 (I) *n* = 70 (C)	*n* = 70 (I) *n* = 70 (C)	Two-arm parallel, RCT	Nurse-led health coaching program	Self-efficacy, QoL, knowledge, burden	Patients: - Significant improvement in self-efficacy at 12 and 24 weeks. - Significant increases in QoL, knowledge, and reduction in unplanned readmissions. Caregivers: - Reduction in burden.
Liu et al. (2023)/ China	Evaluate the effectiveness of the continuing care program.	*n* = 44 (I) *n* = 44 (C)	N/A	Quasi-experimental design	Continuing care program	ADL, disability, recurrence, readmissions	Patients: - Significant improvement in ADL and disability. - Significant decrease in readmission.

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Lu et al. (2023)/ China	Investigate the effect of an "internet + tertiary hospital-primary hospital-family linkage home care" model.	*n* = 40 (I) *n* = 41 (C)	N/A	Retrospective study	Rehabilitation and home care nursing	Degree of nerve defect, QoL, anxiety and depression, self-care ability, exercise ability, treatment compliance	Patients: - The QoL, self-care and exercise ability, and treatment compliance scores were significantly higher than the control group. The nerve defect, anxiety and depression scores were lower than the control group.
Markle–Reid et al. (2020)/Canada	Examine the feasibility and effects of a 6-month integrated transitional care stroke intervention.	*n* = 30	N/A	Mixed-methods feasibility study	Integrated hospital-to-home transitional care	Health-related QoL, depression, anxiety, self-efficacy	Patients: - Feasible and acceptable to older adults and providers. - No significant differences in health outcomes.
Mohammadi et al. (2019)/Iran	Develop and determine the efficacy of a discharge planning program.	N/A	*n* = 30 (I) *n* = 30 (C)	Post-test RCT	Family caregiver-oriented discharge planning	Preparedness, stress	Caregivers: - Preparedness score was significantly higher than the control group. - Stress was lower than the control group.
Mou et al. (2022)/ China	Explore the feasibility, acceptability, and preliminary effects of family-focused dyadic psychoeducation.	*n* = 40 (I) *n* = 40 (C)	*n* = 40 (I) *n* = 40 (C)	Single-blinded, parallel-group RCT	Family-focused dyadic psychoeducation	Physical function, burden, competence, dyads' coping, depression, anxiety, family functioning, dyadic relationships	Patients: - Significant effects in the memory and thinking, and mobility domains. Caregivers: - Significantly greater reduction in burden at post-test and a significant effect on competence.
Mulder et al. (2024)/ Netherlands	Assess the added value of caregiver-mediated exercised combined with telerehabilitation.	*n* = 21 (I) *n* = 20 (C)	*n* = 21 (I) *n* = 20 (C)	Multicenter, observer-blinded RCT	Caregiver-mediated exercises	Self-reported mobility, functional outcome, dyads' psychosocial wellbeing, care transition	Patients: - No significant differential effect on self-reported mobility. - The absence of beneficial effects on functional outcome. Dyads: - No beneficial effects on patients' psychosocial wellbeing. - Positive differential effects in caregivers' wellbeing. - No significant differential effects for the care transition.
Naqvi et al. (2022)/Colombia	Test the feasibility of Telehealth After Stroke Care.	*n* = 25 (I) *n* = 25 (C)	N/A	Parallel 2-armed pilot RCT	Home blood pressure telemonitoring	Feasibility, systolic BP	Patients: - Systolic BP declined by 16 ± 19 mm Hg from baseline. - Higher adherence and retention rate to video visits at 3 months.

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Osborne et al. (2023)/USA	Determine the feasibility of Problem-Solving Training.	*n* = 11	N/A	Single-group feasibility study	Problem-Solving Training	Self-efficacy, depression	Patients: - High satisfaction with training with mild depression at 3 months. - Increased self-efficacy at 3 months post discharge.
Pugliese et al. (2019)/Canada	Demonstrate the feasibility of RecoverNow, a tablet-based stroke recovery platform.	*n* = 30	N/A	Unblinded, single-group, prospective cohort design	Early stroke rehabilitation	Feasibility, barriers	Patients: - Interested in attempting tablet-based stroke rehabilitation. - A tablet-based therapy may be challenging due to patient, device and system-related barriers.
Redzuan et al. (2012)/Malaysia	Evaluate the effectiveness of an intervention using video to deliver therapy.	*n* = 44 (I) *n* = 46 (C)	N/A	RCT	Home-based rehabilitation	Independence levels, complications, stress	Patients: - No significant differences between groups at 3 months for the number of patients who improved in independence and the complication rate. Caregivers: - No differences between groups for the stress.
Reeves et al. (2019)/USA	Test the effects of the home-based social worker-led case management program combined with a website.	*n* = 88 (I_1) *n* = 90 (I_2) *n* = 87 (C)	N/A	Open 3-group parallel-design, RCT	Home-based social worker-led case management	QoL, patient activation, depression, ADL, disability, IADL, readmissions, recurrence	Patients: - Group I_2 (combined website) produced greater gains in physical-health QoL and patient activation. - No effect on mental health.
Ritsma et al. (2023)/Canada	Evaluate the utility of the virtual family conference.	*n* = 48	N/A	Observational cross-sectional study	Educational, preparatory, and transition planning	Knowledge, satisfaction, confidence, preparedness, stress	Caregivers: - Significant improvement in stroke knowledge and transition preparedness. - Significant gains in satisfaction with information provided. - Increased confidence and preparedness. - Reduction in stress.
Saadatnia et al. (2020)/Iran	Evaluate the effectiveness of home-based exercise rehabilitation.	*n* = 20 (I) *n* = 20 (C)	N/A	RCT	Home-based exercise rehabilitation	Functional capacity, ADL	Patients: - Greater improvements in functional capacity, ADL, and functional independence.
Schneider & Howard (2017)/ USA	Examine the effects of using technology for providing information/ education.	*n* = 44 (I) *n* = 42 (C)	N/A	Descriptive comparative design	Individualized post-discharge education	Readiness, coping, readmissions	Caregivers: - No significant differences between groups in readiness and readmission. - Significant differences in coping scores between groups (technology group exhibited higher).

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Shyu et al. (2008)/ Taiwan	Test the effectiveness of a discharge planning program.	*n* = 72 (I) *n* = 86 (C)	*n* = 72 (I) *n* = 86 (C)	RCT	Family caregiver-oriented discharge planning	ADL, caregiver preparation, discharge needs, balance between competing needs	Caregivers: - Significantly better preparation scores compared to before the intervention. - Greater satisfaction of discharge needs at 1 month after discharge. - Outcomes significantly better than the control group after the intervention.
Taghinejad et al. (2018)/Iran	Determine the effectiveness of follow-up calls by nurses.	*n* = 35 (I) *n* = 35 (C)	*n* = 35 (I) *n* = 35 (C)	Non-RCT, pre-/ post-test design	Nurse post-discharge follow-up phone calls	Self-efficacy	Caregivers: - Increase in the self-efficacy mean score, and significantly higher than before the intervention. - Significant difference between groups.
van den Berg et al. (2016)/Australia	Investigate the effects of a well-defined and protocolled 8-week program.	*n* = 31 (I) *n* = 32 (C)	N/A	Pragmatic pilot study	Caregiver-mediated exercise	Physical functions, length of stay (LOS), readmissions, extended ADL, psychosocial functioning, self-efficacy, QoL, fatigue, burden, anxiety, strain	Patients: - Significantly improved (extended) ADL at week 8 and 12. - A 9-day shorter LOS, and fewer readmissions. Caregivers: - Less fatigue and higher self-efficacy at week 12.
Vloothuis et al. (2019)/ Netherlands	Improve functional outcome and facilitate early supported discharge.	*n* = 32 (I) *n* = 34 (C)	*n* = 32 (I) *n* = 34 (C)	Observer-blind RCT	Caregiver-mediated exercise	Physical functions, LOS, extended ADL, mood, self-efficacy, QoL, strain, fatigue	Patients: - Significant effect found for anxiety post intervention, and remained a significant decrease at week 12. Caregivers: - Significant effect found for depression post intervention.
Wong & Yeung (2015)/China	Test the effectiveness of a transitional care program.	*n* = 54 (I) *n* = 54 (C)	N/A	RCT	Home-based nurse-led rehabilitation	QoL, satisfaction, functional performance, depression, healthcare utilization	Patients: - Significant difference between groups for QoL. - Better spiritual QoL, higher satisfaction and physical functions. - Lower depression, readmission and use of emergency room rates than the control group.
Wu et al. (2020)/ China	Explore the feasibility and effectiveness of collaborative care model-based rehabilitation exercise training.	*n* = 30 (I) *n* = 31 (C)	N/A	Two-arm parallel and single blind RCT	Rehabilitation	Physical functions, QoL	Patients: - Greater improvement in motor function, balance ability, and QoL than the control group.

(*Continued*)

Table 1.
Overall Characteristics of Sources of Evidence (n = 42) (Continued)

First Author (year)/Country	Aim	Participant Number		Methodology	Transitional Care Intervention	Outcome	Main Finding
		Patient	Caregiver				
Zhang et al. (2020)/China	Determine the feasibility of a physician-assisted, WeChat-based improvement service and follow-up self-monitoring platform.	*n* = 234 (I) *n* = 234 (C)	N/A	Cohort study	Self-monitoring	Adherence, recurrence, feasibility, acceptability	Patients: - A trend of increasing medication compliance and decreasing ischemic endpoint event rate. - Community-based population displayed good adherence when using WeChat self-monitoring.
Zhou et al. (2019)/ China	Determine the effectiveness of a novel nurse-led, caregiver-delivered model of stroke rehabilitation.	*n* = 116 (I) *n* = 128 (C)	*n* = 116 (I) *n* = 128 (C)	Multi-centered RCT	Nurse-led rehabilitation	Physical functions, health-related QoL, mood, burden	Patients: - No significant difference in adjusted 6-month ADL between groups, and differences across the other outcomes. - It was desirable and positively accepted by nurses, caregivers, and patients, but was considered too complex.

Note: ADL = activities of daily living; BP = blood pressure; C = control group; I = intervention group; $I_{1=}$ intervention group 1; $I_{2=}$ intervention group 2; IADL = instrumental activities of daily living; LOS = length of stay; N/A = not available; QoL = quality of life; RCT = randomized control trial.

studies. A variety of outcomes were assessed, with approximately 33 different outcomes for stroke patients and 24 for caregivers. These outcomes were mapped into specific domains for both groups.

For stroke patients, six outcome domains were identified: 1) physical (e.g., activity of daily living, functional disability, motor function, cognitive function, balance); 2) psychological (e.g., depression, anxiety, adverse mood, coping), 3) social (e.g., community reintegration), 4) economic (e.g., health service utilization, accompanying costs), 5) stroke-related adverse events (e.g., readmissions, recurrences, pressure ulcers, falls, other complications), and 6) self-evaluative domains (e.g., quality of life, self-efficacy, knowledge, patient activation, readiness). Outcome measures predominantly focused on the physical domain, such as functional independence and motor function (24 studies), followed by the self-evaluative domain (20 studies), and the psychological domain (14 studies) (Tables 1 and 4).

Caregivers' outcomes were categorized into four domains: 1) physical (e.g., self-reported fatigue), 2) psychological (e.g., depression, anxiety, strain, mood, burnout, coping), 3) social (e.g., social support, family functioning, dyadic relationship), and 4) self-evaluative domains (e.g., preparedness, competence, knowledge, needs, self-efficacy, quality of life, health). Among these, outcome measures specifically assessed self-evaluative outcomes related to the caregivers' role (Tables 1 and 5).

Findings on Interventions and eHealth Technologies Specific to Elderly Stroke Survivors

Of the 42 studies, only three focused on transitional care interventions for elderly survivors, with average ages ranging from 70.53 (SD ± 5.73) to 74.13 (SD ± 6.49) years. Two studies examined the integration of transitional care systems between hospitals and communities, emphasizing coordination and communication among interdisciplinary teams (Feng et al., 2021; Markle-Reid et al., 2020). The third study reinforced a discharge planning program tailored to individual needs (Shyu et al., 2008) (Table 6). Regarding eHealth technologies used in these interventions, the following were noted: 1) telephone/mobile phones, 2) smartphone/tablet applications, and 3) web-based applications. The features employed included the following: 1) telephone calls/counseling, 2) a web-based portal, and 3) electronic health records. These features appear to be fundamental technologies for older users and administrative systems for healthcare providers (Table 6).

Discussion

The aim of this scoping review was to map the evidence on transitional care interventions developed and tested for stroke survivors and caregivers during the transition between hospital and home. The review also included interventions involving eHealth for elderly stroke survivors. Most studies were conducted in Asian countries, particularly China, and only one study was published as early as 2002. This may indicate the early stages of incorporating eHealth technologies into the transitional care for these populations. Globally, eHealth has evolved significantly over the past two decades, transforming healthcare delivery with innovations such as telemedicine, mobile

Table 2.
Studies Reported the Frameworks (n = 17)

First Author (year)	Study Framework
Bavarsad et al. (2022)	Transitional Care Model (TCM) (Hirschman et al., 2015)
Demir Avci & Gozum (2023)	Transitional Care Model (TCM) (Naylor et al., 2018)
Einerson et al. (2022)	The cognitive orientation to the occupational performance model (Polatajko & Mandich, 2004)
Elsheikh et al. (2022)	Evidence-based guidelines and scientific recommendations
Feng et al. (2021)	The hospital community-integrated service model (HCISM)
Kamalakannan et al. (2023)	Medical Research Council Framework (Skivington et al., 2021)
Lin et al. (2022)	Self-efficacy theory (Bandura, 1997)
Markle-Reid et al. (2020)	Lorig and Holman's self-management theory (Lorig & Holman, 2003); Best practice guidelines and previous published research
Mohammadi et al. (2019)	Adult Learning Theory (Smith, 2002)
Mou et al. (2022)	The researchers' systematic review (Mou et al., 2021); The Double ABC-X model (McCubbin et al., 1983)
Osborne et al. (2023)	Social problem-solving theory (D' Zurilla et al., 2004); The Obesity-Related Behavioral Intervention Trials (ORBIT) model (Czajkowski et al., 2015)
Reeves et al. (2019)	Chronic Care Model (Bodenheimer et al., 2002)
Taghinejad et al. (2018)	Self-efficacy (Bandura, 1997)
Wong & Yeung (2015)	The assessment-intervention-evaluation Omaha System framework (Martin, 2009); National and international clinical guidelines for stroke patients (Hospital Authority 2000, Intercollegiate Stroke Working Party 2004, Duncan et al. 2005, Department of Health, United Kingdom 2007); The transitional care model (4-C features) (Naylor et al., 2004); The recommended principles for stroke rehabilitation care
Wu et al. (2020)	Collaborative remote rehabilitation nursing model (Lott, 1992)
Zhang et al. (2020)	The information-motivation-behavioral skills model
Zhou et al. (2019)	Task-shifting model (Ogedegbe et al., 2014); Training-the-trainer model (Gustavsen et al., 2002); Motor Relearning Theory (Gustavsen et al., 2002)

health applications, electronic health records, and remote monitoring tools. These advancements have aimed to improve accessibility, efficiency, and quality of care, particularly for managing chronic diseases and ensuring continuity of care (WHO, 2016). From 2019 to 2023, researchers increasingly focused on applying eHealth technologies to address transitional care challenges. This surge in interest may be partially attributable to the coronavirus disease 2019 pandemic, which required remote healthcare solutions. However, the primary reason for employing eHealth is the ongoing issues in transitional care and service delivery. The rising trend in utilizing eHealth technologies suggests a promising future for research and application in managing chronic diseases.

Although more than half of the included studies were RCTs, some recently reported studies were pilot feasibility studies. This may be due to the increasing complexity of interventions that combine or integrate eHealth technologies, which often involve multiple technologies rather than just one (Kamalakannan et al., 2023). For instance, interventions may include virtual therapeutic games, 3D video-based exercises, virtual conferences, and web-based education (Edwards et al., 2023). Given this complexity, both users and providers often require initial trials. Therefore, future studies will need larger trials, more robust methodologies, and larger sample sizes to investigate different outcomes and confirm the efficacy of these interventions or programs.

It is noteworthy that the average age of stroke participants in the 39 studies was similar to that of the three studies focused on elderly survivors. A recent scoping review on self-management and mHealth (mobile health) devices among stroke patients revealed similar findings, with the average age of patients ranging from 42 to 72 years (Thompson et al., 2023). While this suggests the potential for applying eHealth interventions to address transitional care issues for older survivors, future eHealth interventions must still account for certain barriers to implementation in this population. Moreover, the average age of caregivers aligned with a previous systematic review on technology-based interventions for psychological issues, reporting ages from 37.9 to 69.7 years (Chin et al., 2022). This is consistent with findings that female spouses and children in this age range often assume stroke caregiving roles.

Different transitional care interventions were identified in 39 studies not specifically focused on elderly stroke survivors. Five core components emerged, with 84.62% of these studies emphasizing health education and skills training for patients and caregivers. This approach aims to enhance stroke-related knowledge, self-care management, and caregiving skills, ultimately improving discharge preparedness, care continuity, and quality of life, as well as yielding positive health and economic outcomes (Carbery et al., 2021). Furthermore, three activities were frequently utilized across studies: educational activities, home visits, and telephone calls. These methods are

Table 3.
Characteristics of Transitional Care Interventions and eHealth Technologies (n = 39)

First Author (year)	Transitional Care Intervention		eHealth Technology		
	Type	**Component**	**Type**	**Feature/Function**	**Intervention Provider**
Aphiphaksakul & Siriphorn (2022)	Home-based exercises	- Balance exercise	- Smartphone/tablet application	- Exercise guide on application	Physical therapists (researchers)
Bakas et al. (2015)	Telephone assessment and skill-building kit	- Need assessment - Education on stroke-related care - Problem-solving skills - Physical & emotional health support	- Telephone/mobile phone	- Telephone calls/counseling	Nurse
Bavarsad et al. (2022)	Transitional care model program	- Stroke care education to patients - Psychological & emotional support - Home visits & phone calls	- Telephone/mobile phone	- Telephone calls/counseling	Nurses (researchers)
Baykal & Tülek (2022)	Discharge training	- Stroke education for patients - Rehabilitation for patients	- Internet website	- Webpage/online resource links/an internet forum	Unclear (maybe nurses)
Bernocchi et al. (2015)	Home-based telesurveillance and rehabilitation	- Stroke education - Rehabilitation for patients - Home visit & videoconference	- Telerehabilitation/ telemedicine - DVD	- Telephone calls/counseling - VDO/virtual conference - VDO/3D VDO for education - Electronic health record	- A nurse-tutor - Physiotherapist
Bitek & Erol (2023)	Discharge training and telephone counselling	- Discharge education related to stroke care - Telephone Counselling	- Telephone/mobile phone	- Telephone calls/counselling	Nurse (researcher)
Chu et al. (2020)	Nurse-trained, family member-delivered rehabilitation	- Rehabilitation skills - Telephone calls	- Telephone/mobile phone - Smartphone/tablet application	- Telephone calls/counselling	- Intervention nurses at hospital - Caregiver at home
Demir Avci & Gozum (2023)	Transitional care program	- Home care - Home visits & phone calls	- Telephone/mobile phone - Smartphone/tablet application - Web-based application	- Telephone calls/counselling - Text messages via phone - Online chat	Nurses (researchers)
Deutschbein et al. (2020)	Care coordination program	- Educational sessions - Medical counselling and organization of access to required health services. - Education materials and healthcare provider support - Home visits & telephone calls	- Telephone/mobile phone	- Telephone calls/counselling	- Nurses (case managers)
Edwards et al. (2023)	Telerehabilitation	- Daily stroke education via taking quizzes. - Rehabilitation targeting arm motor function included functional games, exercise videos, education, and daily assessments.	- Telerehabilitation/ telemedicine	- VDO/virtual conference - VDO/3D VDO for education - Gameplay/virtual therapeutic game - A web-based portal	A licensed therapist (half supervised)
Einerson et al. (2022)	Goal-based education and skills training program	- Education - Skills training: the management of stroke sequelae and techniques to improve caregiver self-care - Community resource recommendations (online & in-person opportunities such as support groups)	- Telephone/mobile phone	- Telephone calls/counselling - VDO/virtual conference - Webpage/online resource links/an internet forum	A licensed occupational therapist

(*Continued*)

Table 3.
Characteristics of Transitional Care Interventions and eHealth Technologies (n = 39) (Continued)

First Author (year)	Transitional Care Intervention		eHealth Technology		
	Type	**Component**	**Type**	**Feature/Function**	**Intervention Provider**
Elsheikh et al. (2022)	Tailored multidimensional intervention	- Health information - Skills building: care-related skills - Emotional and psychological health support - Assisting in controlling appraisal of the current situation - Peer-support groups - Home visits & telephone calls	- Telephone/mobile phone	- Telephone calls/counseling	Intervention nurses
Grant et al. (2002)	Problem-solving skill training	- Problem-solving skill training for caregivers to manage caregiving problems and cope with the stresses of caregiving - Home visits & telephone calls	- Telephone/mobile phone	- Telephone calls/counseling	A trained research nurse
Kang & Li (2022)	Caregiver education program	- Health education and rehabilitation guidance in a short video format	- Smartphone/tablet application	- VDO/3D VDO for education - Online chat	Trained nurses
Kamal et al. (2020)	Stroke caregiver dyad education	- Education for stroke survivors and caregivers (e.g., diet, the need for rehabilitation, complications) with an information booklet - Rehabilitation for patients	- Smartphone/tablet application - Web-based application	- Text messages via phone/email - VDO/3D VDO for education	A multidisciplinary team (i.e., neurophysician, stroke nurse, dietician, and physiotherapist).
Kamalakannan et al. (2023)	Digital therapeutic rehabilitation	- Educational information and guides for stroke survivors	- Smartphone/tablet application - Web-based application	- VDO/virtual conference - VDO/3D VDO for education - Gameplay/virtual therapeutic game	A therapist (with self-practice)
Kim et al. (2012)	Home-based education and support	- Re-education according to the family's needs - Provision of emotional and social support, and information	- Telephone/mobile phone	- Telephone calls/counseling	Nurses (researchers)
Li et al. (2024)	Remote rehabilitation nursing intervention	- Rehabilitation knowledge and materials (VDO, media materials, Q&A VDO) via an online platform - Online chat groups for communication - Home-based rehabilitation exercises - Video follow-ups, remote consultations, and online Q&A	- Smartphone/tablet application (WeChat)	- Online materials for education on the application's public account - Online chat - Video follow-ups/remote consultations/online Q&A	- Neurosurgeons - Neurosurgery nurses - IT personnel
Lin et al. (2022)	Nurse-led health coaching program	- Goal setting, health education, complication prevention, medication management - Enhancing and improving self-care skills, self-management techniques - Telephone calls & outpatient clinic coaching	- Telephone/mobile phone	- Telephone calls/counseling	Intervention nurses

(*Continued*)

Table 3.
Characteristics of Transitional Care Interventions and eHealth Technologies (n = 39) (Continued)

First Author (year)	Transitional Care Intervention		eHealth Technology		
	Type	**Component**	**Type**	**Feature/Function**	**Intervention Provider**
Liu et al. (2023)	Continuing care program	- Develop an individualized disease management plan - Health education - Rehabilitation planning - Psychological support - Telephone consultations - Telephone calls	- Telephone/mobile phone - Smartphone/tablet application	- Telephone calls/counselling - Online chat	- Neurologist - Primary nurse - Community nurse - Hospital nurses - Rehabilitation therapist
Lu et al. (2023)	Rehabilitation and home care nursing	- Health education and early rehabilitation guidance - Routine discharge guidance (home-based self-rehabilitation exercise, medication, diet, rest, and outpatient follow-up - Discharge risk assessment and home care needs assessment - Formulating discharge rehabilitation plans - Home nursing service online orders (home visits/home care)	- Online platform (Smart Hospital platform) - Smartphone application (WeChat)	- Management port - Medical port (connect to the smartphone via WeChat) - Patient port (connect to the smartphone via WeChat)	- Nurses/a rehabilitation nurse/stroke specialist nurses - A nutritionist - A psychological consultant - A physician
Mohammadi et al. (2019)	Family caregiver-oriented discharge planning	- Stroke care education - Telephone calls	- Telephone/mobile phone	- Telephone calls/counseling	Nurses (researchers)
Mou et al. (2022)	Family-focused dyadic psychoeducation	- Education on stroke, self-care, psychosocial adjustment and stress management - Telephone counselling	- Telephone/mobile phone	- Telephone calls/counseling	An experienced nurse
Mulder et al. (2024)	Caregiver-medicated exercises	8-week progressive, task specific exercise program (tailored exercises) - Mobility training	- Telerehabilitation platform (Telerevalidatie.nl)	- Exercise videos, personal instruction, mobility milestones, asynchronous consultations using online messages	- A trained physiotherapist - Family caregivers
Naqvi et al. (2022)	Home blood pressure telemonitoring	- BP education - Telephone calls - Telehealth visits - Home BP monitoring	- Telephone/mobile phone - Tablet application	- Telephone calls/counselling - VDO/virtual conference - A web-based portal - Electronic health record - Telemonitoring	A multidisciplinary team (i.e., primary care nurse practitioner, physicians, pharmacists)
Osborne et al. (2023)	Problem-Solving Training	- Problem-solving skill training step-by-step	- Smartphone/tablet application	- Electronic booster (unclear feature)	An occupational therapy student (trained by the first author)
Pugliese et al. (2019)	Early stroke rehabilitation	- Rehabilitation (speech and cognitive therapy).	- Telephone/mobile phone - Tablet application	- Telephone calls/counselling - Text messages via phone - Gameplay/virtual therapeutic game - A web-based portal	A speech language pathologist/occupational therapist

(*Continued*)

Table 3.
Characteristics of Transitional Care Interventions and eHealth Technologies (n = 39) (Continued)

First Author (year)	Transitional Care Intervention		eHealth Technology		
	Type	**Component**	**Type**	**Feature/Function**	**Intervention Provider**
Redzuan et al. (2012)	Home-based rehabilitation	- At home rehabilitation	- Telerehabilitation/ telemedicine - DVD	- VDO/3D VDO for education	Self-exercise
Reeves et al. (2019)	Home-based social worker-led case management	- Stroke-related education & medication information - Provider contact lists, patient portals, social and community services, stroke support groups, and caregiver resources - Telephone calls	- Telephone/mobile phone - Internet website	- Telephone calls/counseling - Webpage/online resource links/an internet forum	Four masters-level trained social workers.
Ritsma et al. (2023)	Educational, preparatory, and transition planning	- Stroke-related knowledge education and preparation for the hospital-to-home transition	- Telerehabilitation/ telemedicine	- VDO/virtual conference	- Stroke rehabilitation team physiatry physician - An interdisciplinary team (i.e., nursing, occupational therapy, physiotherapy, social worker, speech language pathology)
Saadatnia et al. (2020)	Home-based exercise rehabilitation	- Rehabilitation knowledge - Training for patients and caregivers (the importance of practicing physical activity at home and the principles of the home-based rehabilitation program	- Telephone/mobile phone - DVD	- Telephone calls/counseling - VDO/3D VDO for education	A health education specialist, physiotherapists, occupational therapists, physicians, a sport physiologist, caregivers, and patients
Schneider & Howard (2017)	Individualized post-discharge education	- Stroke-related knowledge education - Telephone calls	- Smartphone/tablet application	- Text messages via phone - A web-based portal	A clinical nurse educator (researcher)
Taghinejad et al. (2018)	Nurse post-discharge follow-up phone calls	- Education and training (Unclear details of training) - Telephone calls	- Telephone/mobile phone	- Telephone calls/counselling - VDO/3D VDO for education	Nurse
van den Berg et al. (2016)	Caregiver-mediated exercise	- Exercises training - Telehealth visits - Home visits	- Smartphone/tablet application	- VDO/virtual conference - Exercise guide on application - Telemonitoring	Physiotherapists
Vloothuis et al. (2019)	Caregiver-mediated exercise	- Exercises training	- Telephone/mobile phone - Smartphone/tablet application - Telerehabilitation/ telemedicine	- Telephone calls/counselling - Text messages via phone - VDO/virtual conference - Exercise guide on application	Trained physical therapists

(*Continued*)

Table 3.
Characteristics of Transitional Care Interventions and eHealth Technologies (n = 39) (Continued)

First Author (year)	Transitional Care Intervention		eHealth Technology		Intervention Provider
	Type	Component	Type	Feature/Function	
Wong & Yeung (2015)	Home-based nurse-led rehabilitation	- Education related to stroke care and management, exercise, medication, emotional management, etc. - Telephone calls - Home visits	- Telephone/mobile phone	- Telephone calls/counseling	Holistic case managers (nurses acted as a care provider and coordinator) that supported by a multidisciplinary team
Wu et al. (2020)	Rehabilitation	- At home rehabilitation	- Telerehabilitation/ telemedicine	- VDO/virtual conference	- Rehabilitation nurse - Rehabilitation engineer
Zhang et al. (2020)	Self-monitoring	- Health education lectures for self-monitoring and preventing stroke recurrent	- Smartphone/tablet application - Internet website	- Online chat - Electronic health record - Telemonitoring	Neurologists
Zhou et al. (2019)	Nurse-led rehabilitation	- Education about stroke and rehabilitation - Exercise training - Telephone calls	- Telephone/mobile phone	- Telephone calls/counselling	- Nurses - Caregiver delivered skills to patients

Note: 3D = three dimensional; DVD = digital versatile disc; Q&A = questions and answers; VDO = video disk object.

fundamental to transitional care and have consistently demonstrated effectiveness in stroke populations and other chronic diseases (Bavarsad et al., 2022). Additionally, the core components align with the seven essential elements of transitional care outlined in the National Transitions of Care Coalition's Care Transition Bundle (NTOCC, 2022), which include: 1) medication management services and coordination; 2) transition planning; 3) patient and identified family caregiver engagement and education; 4) information transfer; 5) follow-up care; 6) healthcare provider engagement and shared accountability across the health continuum; and 7) the triad of physical health, mental health, and social determinants of health. Given the increasing complexity of care required for stroke survivors and their caregivers, more comprehensive, multicomponent interventions are necessary for taking into account to improve transitional care outcomes.

Many interventions predominantly addressed patients' needs, with the care content being taught or trained through their caregivers, who bear the primary responsibility for care (Bitek & Erol, 2023). A possible explanation is that healthcare providers aim to help patients recover as quickly as possible, focusing more on patients and extending efforts to caregivers by providing all necessary knowledge and skills to improve caregiving capacity. Consequently, the care burden on caregivers may be alleviated by the patient's improved recovery. On the other hand, two selected studies revealed transitional care interventions with eHealth that primarily supported caregivers. These caregivers were trained in problem-solving skills and received both physical and emotional health support (Bakas et al., 2015; Grant et al., 2002). Notably, the included studies lacked content specifically focused on caregivers themselves. Two studies designed interventions as dyadic interventions (Kamal et al., 2020; Mou et al., 2022). A dyadic intervention involves both patients and caregivers in transitional care, encouraging mutual support and well-being. Although previous evidence has supported illness management as a dyadic phenomenon, most studies have focused solely on patient management. The theory of Dyadic Illness Management highlights that patient-family caregiver dyads should be regarded as having a shared relationship, aimed at optimizing dyadic health (Lyons & Lee, 2018). Unfortunately, the two dyadic intervention studies primarily investigated either stroke patients' or caregivers' outcomes, suggesting they may not truly embody the dyadic nature of care. This emphasizes the need to develop innovative methods that enhance positive outcomes for both members of the dyad, rather than focusing on just one. Future studies may be designed as genuine dyadic transitional care interventions that address the balanced needs of both members.

Regarding eHealth technologies, telephones, mobile phones, and smartphone applications were the most common choices. While simple technologies like telephones or mobile phones were used for calling, messaging, and remote counseling, more complex technologies offered features for education, informational resources, training, rehabilitation and caregiving skills, remote communication, and administrative support for healthcare providers. Nevertheless, eHealth technologies are widely recognized among therapists in the stroke field for enhancing rehabilitation, particularly for physical exercises (Marwaa

Table 4.
Outcomes and Outcome Measures in Stroke Patients

Outcome	Outcome Measure
ADL/Functional independence/Self-care ability/Functioning	Barthel index (BI); Modified Barthel Index (MBI); Stroke Impact Scale (SIS); Nottingham Extended ADL; Exercise of Self-care Agency (ESCA) scale
Functional status	BI; Modified Rankin Scale (mRS)
Functional disability	BI; National Institutes of Health Stroke Scale (NIHSS); mRS; simplified mRS
Functional recovery	Tinetti scale; Berg Balance scale; Motricity Index; nine-hole peg test (NHPT); 6-minute walking test (6MWT); MBI
Motor function	Upper Extremity Fugl-Meyer (UEFM); Box and Block Test (BBT); 9-hole Peg Test (NHPT); grip strength, pinch strength, 14-item motor activity log; SIS; Fugl-Meyer Upper and Lower Extremity Sensorimotor Score; Rivermead Mobility Index (RMI); Timed Up and Go test; Motricity Index; Functional Ambulation Category
Balance	Function in sitting test (FIST); Postural assessment scale in stroke patients (PASS); Berg Balance Scale
Cognitive function	Montreal Cognitive Assessment (MoCA)
Cognitive impairment	Mini-mental state examination (MMSE)
QoL	12-item Short-Form Health Survey (SF-12); EuroQoL-VAS; Short Stroke-Specific QoL Scale (SSQoL-12); Stroke-Specific QoL Scale (SS-QoL); Patient-Reported Outcomes Measurement Information System Global-10 (PROMIS Global-10); SF-36; WHO-quality of life Spirituality, religion and Personal Beliefs (WHO-QOL-SRPB)
Health-related QoL	EuroQol five dimensions questionnaire (EQ-5D); SF-12
Readmissions	Form for patient outcome measures; Medical records; Stroke Health Coaching Diary
Recurrence	Medical records
Adverse events (pressure ulcers, falls, secondary stroke, urinary tract infections)	Form for patient outcome measures; Stroke Health Coaching Diary
Reintegration	Reintegration to Normal Living Index (RNLI)
Self-efficacy	General Self-Efficacy Scale (GSES); Stroke Self-efficacy Questionnaire (SSEQ)
Stroke knowledge	Stroke Prevention Knowledge Questionnaire (SPKQ)
Patient activation	Patient Activation Measure (PAM)
Discharge readiness/Care transition	Readiness for Hospital Discharge Form; Transition Preparedness Scale
Treatment compliance	A self-made questionnaire; a hospital-designed compliance evaluation form
Coping	Post-discharge Coping Difficulty Scale
Depression/Anxiety/Adverse mood	Beck Depression Inventory (BDI); Geriatric Depression Scale (GDS); Hospital Anxiety and Depression Scale (HADS); Zung's Self-rating Depression Scale (SAS) and Zung's Self-rating Depression Scale (SDS); Patient Health Questionnaire-8 (PHQ-8); Patient Health Questionnaire Depressive Symptom Scale (PHQ-9); Neuro-QoL anxiety; Center for Epidemiological Studies for Depression Scale (CES-D)
Fatigue	Fatigue Severity Scale (FSS)
Mortality	Verbal autopsy scale
Health service utilization	Patients' claims records; Health and Social Services Utilization Inventory (HSSUI)
Accompanying costs	Patients' claims records
Blood pressure	Standardized methods in the central laboratory
Blood glucose/cholesterol	Standardized methods in the central laboratory

Note: ADL = activities of daily living; QoL = quality of life.

et al., 2022). Previous evidence on post-stroke care reported the benefits of telerehabilitation as an eHealth technology for delivering therapies for chronic stroke, such as physical, speech, and cognitive therapies. It was expected to offer remote rehabilitation exercises, increasing accessibility and convenience for users (Nikolaev et al., 2022). Similarly, several included studies revealed positive outcomes, such as significant improvements in patients' functional abilities and better results for caregivers (Demir Avci & Gozum, 2023; Li et al., 2024). This indicates that eHealth technologies hold significant potential for transitional care as well as stroke-related care in the current era. However, the application of eHealth technologies presents some challenges, such as digital literacy, access for low-income populations, and concerns regarding data security and privacy. Several

Table 5.
Outcomes and Outcome Measures in Family Caregivers

Outcome	Outcome Measure
Preparedness	Preparedness for Caregiving Scale (PCS)
Competence	Caregiving Competence Scale (CCS)
Knowledge	Stroke Knowledge and Community Transition Preparedness Questionnaire
Discharge needs	Caregiver Discharge Needs Satisfaction Scale
Balance between competing caregiver needs	Perception of Balance between Competing Needs Scale
Problem solving skills	Social Problem-Solving Inventory (sixth grade version)
Coping	Family Crisis-Oriented Personal Evaluation Scale (F-COPE)
Self-efficacy	General Self-Efficacy Scale (GSES); Sherer self-efficacy questionnaire
QoL	12-item Short-Form Health Survey (SF-12); WHO Quality of Life-BREF; Carer Quality of Life Scale; Care-related QoL Instrument
General health	Short Form Health Survey (SF-36)
Health state	Visual analogue scale (VAS)
Life changes	The 15-item Bakas Caregiving Outcomes Scale (BCOS)
Unhealthy day	Unhealthy Days (UD)
Depressive symptoms/Anxiety	Patient Health Questionnaire Depressive Symptom Scale (PHQ-9); 20-item Center for Epidemiological Studies Depression Scale; Generalized Anxiety Disorder-7 (GAD-7); Hospital Anxiety and Depression Scale (HADS); PROMIS Computer Adaptive Tests for anxiety and depression
Family strain/Stress	Family Strain Questionnaire; Kingston Caregiver Stress Scale (KCSS); Caregiver Strain Index; modified Caregiver Strain Index; Expanded Caregiver Strain Index
Burden	Zarit Caregiver Burden Scale (ZCBS); Zarit Burden Interview-short form (ZBI-12); Caregiver Burden Inventory (CBI); Caregiving Burden Scale; Modified Caregiver Strain Index (CSI)
Burnout	The Maslach Burnout Inventory-General Form (MBE-GF)
Fatigue	Fatigue Severity Scale (FSS)
Social support	Ma's (1998) tool
eHealth literacy	e-Health Literacy Scale
Family functioning	General functioning subscale of Family Assessment Device (GF-FAD)
Dyadic relationship	Mutual Scale (MS)

Note: QoL = quality of life.

studies reported obstacles related to digital health adoption and provided suggestions for addressing these issues (Niyomyart et al., 2024). As a result, future research can be designed to integrate a personalized eHealth-driven approach to stroke transitional care, with intensive plans to address these challenges.

In terms of the outcome measures, both generic and stroke-specific tools were used to assess intervention results and disease impacts. Several standard measures were employed for patients, such as the Barthel Index, Stroke Impact Scale (SIS), and modified Rankin Scale for measuring activities of daily living and functional status. The 12-item Short-Form Health Survey and the EuroQuality of Life five-dimension questionnaire (EQ-5D) were used to evaluate quality of life. These tools have undergone rigorous testing to ensure their acceptability. However, there is growing interest in patient-reported outcome measures (PROMs), which gather direct information from patients. Patient-reported outcome measures are believed to provide valuable insights into patients' perceptions of their stroke and its impact on their lives, making these measures highly relevant for them (Schmidt et al., 2023). This scoping review found that both multidimensional generic PROMs (e.g., EQ-5D, Neuro-QoL, Patient-Reported Outcomes Measurement Information System Global-10 [PROMIS Global-10]) and stroke-specific PROMs (e.g., SIS, Stroke-Specific Quality of Life scale [SS-QoL]) were employed. While multidimensional stroke-specific measures cover a wide range of health aspects, they may not effectively capture changes over time. The evidence suggests that researchers may consider using unidimensional, domain-specific measures alongside performance-based or clinician-observed measures (Reeves et al., 2018). For caregivers, the measures typically focused on caregiving contexts during discharge preparation, such as the Preparedness for Caregiving Scale and Caregiving Competence Scale, as well as caregiving impacts like quality of life, psychological issues, and caregiver burden. Overall, these align with an up-to-date systematic review that presented caregiver burden measures (Tziaka et al., 2024). Unfortunately, there is limited evidence specifically

Table 6.
Findings on Interventions and eHealth Technologies Specific to Elderly Stroke Survivors (n = 3)

		Transitional Care Intervention		eHealth Technology		
First Author (year)	**Participants' Age**	**Type**	**Component**	**Type**	**Feature/ Function**	**Intervention Provider**
Feng et al. (2021)	Mean = 70.52 (SD ± 5.73) (range = 61–81 years)	Hospital-community integrated service model	- The integrated system of transitional care between hospital and community to support transferring patients (paid attention to the system). - Telephone calls - Home visits	- Telephone/ mobile phone - Smartphone/ tablet application	- Telephone calls/ counselling - Online chat	Nursing staff in hospital and community
Markle-Reid et al. (2020)	Mean = 71.60 (No SD)	An integrated hospital-to-home transitional care intervention	- Coordination and communication among an interdisciplinary team - Home visits	- Web-based application	- A web-based portal - Electronic health record	An interprofessional (IP) team (occupational therapist, physiotherapist, speech language pathologist, registered nurse, social worker).
Shyu et al. (2008)	Mean = 74.13 (SD ± 6.49)	A family caregiver-oriented discharge planning program	- Individualized health information based on the needs via oral and written instructions - Demonstrating specific caregiving skills - Telephone calls - Home visits	- Telephone/ mobile phone	- Telephone calls/ counselling - Online chat	Research nurses

Note: SD, standard deviation.

debating other stroke caregivers' outcomes and measurements, particularly transitional care outcomes. The variety of outcomes and measures in this review underscores the need for core outcome sets to enhance stroke patient- and caregiver-centered care, especially during the transitional care period.

In elderly stroke survivors, evidence on transitional care interventions tailored to them and their caregivers, especially those integrating or combining eHealth technologies, remains limited. While the study by Shyu et al. (2008) focused on a traditional discharge planning program, the other two studies (Feng et al., 2021; Markle-Reid et al., 2020) aimed to address transitional care issues between hospital and community by improving coordination and communication within interdisciplinary teams. The traditional program aimed to prepare caregivers for their roles and provide post-discharge support. Its strength lies in being well-structured and tailored to individual needs. Importantly, the program emphasized the balance between caregiving needs and other demands prior to discharge, a topic often overlooked in the existing literature. In contrast, the two studies shared a perspective of integrated transitional care, bringing together services, providers, and organizations across care settings to support patients post-discharge. It is believed that elderly survivors have complex needs due to more severe disability and multimorbidity. They require effective cooperation among patients, caregivers, and healthcare providers across different care settings. For example, a project based on evidence-based practices for transitioning older patients from hospital to community in a developing country like Thailand also had embedded both discharge planning and care coordination between the settings (Monkong et al., 2020).

In addition to the interventions for older persons, eHealth technologies, including telephones and mobile applications, were employed to assist in the transition. While telephone calls and counseling served as fundamental approaches to continuing care, mobile applications, and web-based platforms provided informational support and resource access for patients and caregivers. The applications also facilitated care coordination and communication within the healthcare team, acting as a bridge between healthcare recipients and providers. A recent study highlighted significant concerns regarding the use of digital health technology, even in a developing country, to support collaboration among healthcare settings for elderly stroke survivors (Thiengtham et al., 2024). This finding underscores the importance of intensively designing eHealth technologies to meet the complex care needs of elderly survivors and their caregivers during the transitional care period, while considering the differences in healthcare systems.

Strengths and Limitations

This scoping review is methodologically strong and comprehensive, analyzing 42 studies from diverse regions, including Asia, Europe, America, Africa, and Australia. The global representation offers insights into transitional care interventions across various healthcare systems and cultural contexts. The inclusion of multiple study designs—RCTs, pilot studies, and other experimental research—adds robustness to the findings and highlights

the range of methodologies applied to stroke care for survivors and caregivers. Reporting of eHealth technologies highlights the potential of digital tools to enhance intervention delivery, especially for elderly stroke survivors. Additionally, mapping a wide array of outcome measures into patient and caregiver domains allows for a nuanced understanding of the multifaceted impacts of stroke and transitional care. Lastly, the review identifies critical gaps, such as the lack of dyadic interventions using eHealth technologies and the limited focus on elderly stroke survivors, guiding future research priorities.

Despite these strengths, the review faced a few challenges. Only English-language articles were included, which may have excluded valuable studies conducted in other languages. The heavy concentration of studies from Asia, particularly China, may limit the applicability of the synthesized findings to other regions with different healthcare infrastructures and cultural approaches to caregiving. Lastly, the limited literature focused on older survivors presents a challenge, as there may be insufficient specific data to guide future studies.

Conclusion

The use of eHealth in stroke transitional care, especially for older individuals and caregivers, is relatively new. Common interventions included health education, caregiving skills training, and follow-up care, mainly provided by nurses. eHealth technologies such as telephone counseling, video conferencing, and smartphone applications were widely integrated to support patients and caregivers, highlighting the potential of digital tools in stroke care. Patients' outcomes were categorized into six domains focusing on physical and self-evaluative measures, while caregivers' outcomes were assessed across four domains, particularly self-evaluative and psychological impacts. No studies developed dyadic transitional care interventions via eHealth technologies, with a notable gap in interventions tailored for elderly survivors, as only three studies addressed this population specifically. This scoping review can guide researchers in identifying key types and components of interventions tailored to care receivers' needs. eHealth technologies offer promising avenues to enhance stroke transitional care, bridging gaps in access and improving outcomes for patient-caregiver dyads.

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Supplementary Table 1.
Characteristics of Sources of Evidence (n = 42)

First author (year)	Country	Participants' characteristics			
		Intervention		Control	
		Patients	Caregivers	Patients	Caregivers
Aphiphaksakul & Siriphorn (2022)	Thailand	n = 16 Mean age = 59.38(±11.09) Males = 6	N/A	n = 16 Mean age = 59.38(±10.80) Males = 7	N/A
Bakas et al. (2015)	USA	n = 121 Mean age = 62.70(±14.50) Males = 60	n = 123 Mean age = 54.00(±12.50) Males = 27	n = 130 Mean age = 63.40(±14.50) Males = 66	n = 131 Mean age = 54.70(±11.40) Males = 28
Bavarsard et al. (2022)	Iran	n = 40 Mean age = 61.45(±11.84) Males = 25	N/A	n = 40 Mean age = 60.70(±13.54) Males = 25	N/A
Baykal & Tulek (2022)	Turkey	Webpage: n = 20 Mean age = 61.00(±16.96) Males = 9 Booklet: n = 19 Mean age = 59.37(±17.89) Males = 8	Webpage: n = 20 Mean age = 42.35(±13.10) Males = 5 Booklet: n = 19 Mean age = 45.16(±14.89) Males = 4	n = 20 Mean age = 65.25(±14.61) Males = 14	n = 20 Mean age = 47.55(±11.56) Males = 4
Bernocchi et al. (2015)	Italy	Sub-acute: n = 15 Mean age = 71.11(±11.00) Males = 8 Chronic: n = 11 Mean age = 70.00(±8.00) Males = 8	N/A	N/A	N/A
Bitek & Erol (2023)	Turkey	n = 34 Mean age = 68.47(±13.04) Males = 22	n = 34 Mean age = 54.61(±11.73) Males =10	n = 35 Mean age = 67.91(14.37) Males = 22	n = 35 Mean age = 51.60(14.18) Males = 10
Chu et al. (2020)	China	n = 31 Mean age = 62.84(±9.2) Males = 10	N/A	n = 30 Mean age = 66.17(±8.51) Males =14	N/A
Demir Avci et al. (2023)	Turkey	n = 33 Mean age = 60.97(±15.73) Males = 19	n = 33 Mean age = 35.48(±10.77) Males = 6	n = 30 Mean age = 62.09(±13.72) Males = 14	n = 30 Mean age = 36.07(±10.88) Males = 3
Deutschbein et al. (2020)	Germany	Telephone n = 60 Mean age = 75.40 (±9.30) Males = 35	N/A	Face-to-face n = 31 Mean age = 75.00 (±9.20) Males = 13	N/A
Edwards et al. (2023)	USA	n = 16 Mean age = 61.26(±9.36) Males = 10	N/A	N/A	N/A
Einerson et al. (2022)	USA	n = 28 Mean age = 57.60(±13.25) Males = 22	n = 28 Mean age = 51.10(±13.63) Males = 5	N/A	N/A
Elsheikh et al. (2022)	Egypt	n = 55 Mean age = 65.75 (±10.34) Males = 45	n = 55 Median age (Min-Max) = 35 (25-55)	n = 55 Mean age = 65.58 (±9.94) Males = 41	n = 55 Median age (Min-Max) = 35 (25-57)
Feng et al. (2021)	China	n = 60 Mean age = 70.52(±5.73) Males = 33	N/A	n = 60 Mean age = 70.27(±5.41) Males = 31	N/A
Grant et al. (2002)	USA	Mean age by gender: Men (n = 35) = 73.30(±9.00) Women (n = 39) = 75.00(±12.00)	Mean age by gender: Men (n = 7) = 58.00(±12.00) Women (n = 67) = 56.00(±12.00)	N/A	N/A

(*Continued*)

Supplementary Table 1.
Characteristics of Sources of Evidence (n = 42) (Continued)

First author (year)	Country	Participants' characteristics			
		Intervention		Control	
		Patients	Caregivers	Patients	Caregivers
Kang & Li (2022)	China	n = 86 Mean age = 65.10(±8.00) Males = 54	n = 86 Mean age = 50.50(±8.40) Males = 24	n = 84 Mean age = 65.30(±8.50) Males = 58	n = 84 Mean age = 49.30(±8.40) Males = 19
Kamal et al. (2020)	Pakistan	n = 155 Mean age = 60.60(±12.00) Males = 109	n = 155 Mean age = 38.70 (±11.70)	n = 155 Mean age = 59.70(±14.30) Males = 100	n = 136 Mean age = 39.80 (±14.00)
Kamalakannan et al. (2023)	India	Patients & caregivers Phase1: n = 10 Phase2: n = 30 Not presented ages and genders.	N/A	N/A	N/A
Kim et al. (2012)	South Korea	n = 42 Mean age = 64.60(±11.0)	n = 42 Mean age = 56.00(±11.30) Males = 16.70%	n = 31 Mean age = 66.00(±9.1)	n = 31 Mean age = 50.70(±17.2) Males = 19.40%
Li et al. (2024)	China	n = 80 Mean age = 59.40(±12.30) Males = 58	N/A	n = 79 Mean age = 59.90(±14.30) Males = 55	N/A
Lin et al. (2022)	China	n = 70 Mean age = 60.80(±11.00) Males = 54	n = 70 Mean age = 54.50(±11.90) Males = 24	n = 70 Mean age = 62.50(±10.90) Males = 52	n = 70 Mean age = 53.80(±11.00) Males = 22
Liu et al. (2023)	China	n = 44 Median age (Min-Max) = 72.00(65.30-78.80) Males = 18	N/A	n = 44 Median age (Min-Max) = 73.00(68.00-79.80) Males = 20	N/A
Lu et al. (2023)	China	n = 40 Mean age = 59.38(±9.21)	N/A	n = 41 Mean age = 58.12(±16.54)	N/A
Markle-Reid et al. (2020)	Canada	n = 30 Mean age = 71.60 Males = 53.30%	N/A	N/A	N/A
Mohammadi et al. (2019)	Iran	N/A	n = 30 Mean age = 39.63 Males = 13	N/A	n = 30 Mean age = 37.10 Males = 10
Mou et al. (2022)	China	n = 40 Mean age = 49.95(±11.51) Males = 14	n = 40 Mean age = 45.61(±12.14) Males = 11	n = 40 Mean age = 53.85(±11.28) Males = 14	n = 40 Mean age = 48.10(±12.20) Males = 10
Mulder et al. (2024)	Netherlands	n = 21 Mean age = 61.30(±11.20) Males = 11	n = 21 Mean age = 58.40(±10.90) Males = 10	n = 20 Mean age = 63.00(±8.90) Males = 12	n = 21 Mean age = 60.20(±12.20) Males = 10
Naqvi et al. (2022)	Colombia	n = 25 Mean age = 65.90(±15.60) Males = 64%	N/A	n = 25 Mean age = 62.60(±12.40) Males = 64%	N/A
Osborne et al. (2023)	USA	n = 11 Mean age = 61.40(±12.90) Males = 8	N/A	N/A	N/A
Pugliese et al. (2019)	Canada	n = 30 Median age (Range) = 75(40-95) Males = 21	N/A	N/A	N/A
Redzuan et al. (2012)	Malaysia	n = 44 Mean age = 63.70(±12.00) Males = 21	N/A	n = 46 Mean age = 59.40(±11.00) Males = 31	N/A

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Supplementary Table 1.
Characteristics of Sources of Evidence (n = 42) (Continued)

First author (year)	Country	Participants' characteristics			
		Intervention		Control	
		Patients	Caregivers	Patients	Caregivers
Reeves et al. (2019)	USA	Group 1 n = 88 Mean age = 67.50(±13.00) Males = 40 Group 2 n = 90 Mean age = 66.10(±12.70) Males = 49	N/A	n = 87 Mean age = 65.20(±13.90) Males = 45	N/A
Ritsma et al. (2023)	Canada	n = 48 Mean age = 75.00(±11.16) Males = 26	N/A	N/A	N/A
Saadatnia et al. (2020)	Iran	n = 20 Mean age = 62.00(±12.40) Males = 9	N/A	n = 20 Mean age = 66.00(±12.40) Males = 8	N/A
Schneider & Howard (2017)	USA	n = 44 Mean age = 62.50 Males = 21	N/A	n = 42 Mean age = 66.60 Males = 22	N/A
Shyu et al. (2008)	Taiwan	n = 72 Mean age = 74.13(±6.49) Males = 44	n = 72 Mean age = 47.30(±13.4) Males = 28	n = 86 Mean age = 74.20(±6.51) Males = 45	n = 86 Mean age = 48.30(±14.00) Males = 34
Taghinejad et al. (2018)	Iran	n = 35 Mean age = 67.46(±12.55) Males = 21	n = 35 Mean age = 39.29(±8.97) Males = 18	n = 35 Mean age = 64.77(13.34) Males = 16	n = 35 Mean age = 36.51(±11.97) Males = 14
van den Berg et al. (2016)	Australia	n = 31 Mean age = 64.50(±18.50) Males = 19	N/A	n = 32 Mean age = 70.10(±12.40) Males = 21	N/A
Vloothuis et al. (2019)	Netherlands	n = 32 Mean age = 60.53(±14.82) Males = 21	n = 32 Mean age = 53.91(±14.90) Males = 9	n = 34 Mean age = 59.26(±15.01) Males = 20	n = 34 Mean age = 54.00(±12.26) Males = 13
Wong & Yeung (2015)	China	n = 54 Mean age = 67.50(±11.60) Males = 20	N/A	n = 54 Mean age = 71.15(±11.60) Males = 20	N/A
Wu et al. (2020)	China	n = 30 Mean age = 56.73(±11.85) Males = 19	N/A	n = 31 Mean age = 59.10(±8.60) Males = 17	N/A
Zhang et al. (2020)	China	n = 234 Mean age = 59.95(±14.42) Males = 171	N/A	n = 234 Mean age = 62.34(±11.67) Males = 168	N/A
Zhou et al. (2019)	China	n = 116 Mean age = 64.30(±9.20) Males = 44.6%	n = 116 Mean age = 51.40(±12.30) Males = 49.1%	n = 128 Mean age = 66.20(±9.40) Males = 43.8%	n = 128 Mean age = 52.30(±12.80) Males = 48.4%