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Exploring Education Interventions for Stroke Prevention Among Adults and Older Individuals: A Scoping Review

Mehdi Abbasian^{1,2} | Hosna Rashidi Birgani³ | Roghayeh Khabiri³ | Leila Namvar⁴ | Leila Jahangiry⁵ 

¹Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran | ²Department of Geriatric Health, Faculty of Health Sciences, Tabriz University of Medical Sciences, Tabriz, Iran | ³Tabriz Health Services Management Research Center, Tabriz University of Medical Sciences, Tabriz, Iran | ⁴Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran | ⁵Research Center for Evidence Based Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Correspondence: Leila Jahangiry (Jahangiryleila@gmail.com)

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ABSTRACT

Background and Aims: This investigation aims to conduct a comprehensive review of educational interventions targeting stroke prevention to provide effective preventive measures and optimize resource utilization in adults and the elderly populations.

Methods: A comprehensive literature search was conducted on PubMed, SCOPUS, and Embase for articles published online or in print until February 22, 2022. Inclusion criteria for studies were limited to the studies that examined stroke education or training interventions aimed at improving knowledge among adults aged 30 years and above, with a particular focus on older adults.

Results: A review of 97,848 papers was conducted, resulting in the inclusion of 19 papers. Of these, six were randomized controlled trials (RCTs), six were non-randomized studies, five were campaign studies, one was a cross-sectional study, one was a pilot study, and one was a prospective study. The provided information describes various interventions and educational programs related to stroke awareness, prevention, and management. The intervention subjects were categorized as awareness of warning signs and symptoms of stroke ($n = 14$), comprehensive awareness campaigns ($n = 5$), multilevel strategies for stroke education ($n = 4$), community-based nursing education and rehabilitation program ($n = 5$), multimedia campaign for 9-1-1 awareness ($n = 3$), and self-management interventions ($n = 1$).

Conclusion: The categorized interventions, addressing awareness of warning signs and symptoms, comprehensive awareness campaigns, multilevel strategies, community-based nursing education and rehabilitation programs, multimedia campaigns for 9-1-1 awareness, and self-management interventions, collectively enrich our understanding of the multifaceted approaches to stroke education.

1 | Introduction

Stroke risk factors encompass a broad spectrum, including biological, physiological, cardiovascular, hematological, behavioral, environmental, psychological, medical history, medication, and

inflammatory factors [1, 2]. These risk factors can also be classified into modifiable and nonmodifiable categories [3]. Strokes significantly impact healthcare expenditure, representing 3% of total healthcare costs and 27% of the GDP spent on this condition [4]. Effectively recognizing and managing these risk factors can help

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lower the incidence of stroke among older adults, thereby reducing stroke-related deaths [5]. Despite advancements in acute stroke care, stroke continues to be a leading cause of long-term disability, with many survivors requiring assistance for daily activities [6].

Given the growing elderly population, there is an increased demand for educational services and programs to prevent non-communicable and disabling illnesses like stroke. While numerous research and guidelines have been developed for stroke prevention, few are specifically tailored to elderly people. Therefore, a comprehensive review of existing health education plans, models, and strategies for stroke in older adults is essential to provide effective preventive measures and optimize resource utilization. Prioritizing suitable models and programs for stakeholders, target groups, stroke patients, and their informal caregivers is crucial, as these groups express a need for more information and support [2, 3, 7]. Research indicates that many patients and caregivers lack a comprehensive understanding of stroke, its risk factors, preventive strategies, and available sources of assistance, both legal and informal [2, 3, 8]. Despite the efforts of healthcare professionals and voluntary organizations, the informational needs of patients and caregivers remain unmet. Possible reasons include unclear or complex information, generality of content, or patient disinterest or neglect.

Educational interventions for stroke prevention among adults and older individuals have demonstrated varying degrees of effectiveness, particularly when tailored to address specific risk factors and delivered through appropriate channels. Community-based interventions have been widely used to increase awareness and promote behavior change, with studies indicating that such programs can significantly enhance knowledge of stroke symptoms and risk factors, leading to better prevention practices. For instance, a study [9] found that community education programs significantly improved awareness of stroke warning signs and the importance of timely medical intervention in underserved populations. Additionally, technology-enhanced interventions, such as mobile health applications and telemedicine, have shown promise in delivering personalized education and continuous support, especially for managing chronic conditions like hypertension, a major risk factor for stroke [10]. However, while mass media campaigns have been successful in raising awareness on a broader scale, their impact on sustained behavior change remains limited, highlighting the need for more interactive and targeted approaches [11]. Overall, the effectiveness of these interventions depends on factors such as accessibility, cultural relevance, and the ability to sustain long-term behavior changes, particularly in resource-limited settings [12].

A significant gap that prompted the need for this scoping review was the diverse range of educational approaches concerning stroke. Recognizing the importance of managing stroke risk factors well before old age, this study focused on individuals over 30. The objective was to compile various methods related to stroke prevention education and information dissemination. By doing so, the study aims to contribute meaningfully to alleviating the burden of stroke-related diseases and their complications within communities. This comprehensive approach seeks to enhance awareness and promote proactive measures, leading to better health outcomes for individuals at

risk. Therefore, the investigation focused on exploring various educational strategies related to stroke prevention for adults and the elderly, without specifying particular outcomes. The aim was to review and analyze the general landscape of stroke education initiatives, encompassing a broad range of approaches aimed at prevention.

2 | Methods

2.1 | Study Design

A scoping review was conducted following a predetermined protocol, with no planned quantitative synthesis of outcomes due to expected heterogeneity. The review adheres to the PRISMA Extension for Scoping Reviews [4]. The primary objective of this research was to investigate various educational models related to stroke. To accomplish this, we analyzed the structure of stroke interventions and education strategies. We also extracted factors such as design, duration of intervention, setting, participants, specific interventions, measures, and outcomes for each study. This comprehensive analysis aimed to present results and draw more precise conclusions.

2.2 | Search Strategy

A systematic search strategy was developed to identify educational programs or methods aimed at enhancing stroke knowledge. A comprehensive literature search was conducted on PubMed, SCOPUS, and Embase for articles published online or in print until February 22, 2022. Two independent investigators with formal research training reviewed titles, abstracts, and full-text papers. Discrepancies were resolved through discussion with the review team until a consensus was reached. The search strategy was based on the scheme derived from the classical PICO algorithm. The keywords included in the search are presented in Table 1.

2.3 | Eligibility Criteria

Inclusion criteria for studies were limited to the studies that examined stroke education or training interventions aimed at improving knowledge among adults aged 30 years and above, with a particular focus on older adults. Studies exclusively describing disease characteristics were excluded. Eligibility criteria covered all original study types, including qualitative or mixed-methods designs. However, educational approaches focusing on pediatric, teenage, and youth-specific populations were excluded, warranting a separate review. Non-English language publications and gray literature, such as conference abstracts, were excluded due to resource constraints (see Figure 1).

2.4 | Definitions

The present study defines stroke education and training methods as any designs that aim to impart information to enhance knowledge about stroke, without any predetermined restrictions

TABLE 1 | Keywords used in the search.

Keywords	Search strategy
1 Interventions	“health education”[MeSH Terms] OR “health education”[Title/Abstract] OR “health education”[Other Term] OR “health promotion”[Other Term] OR “health promotion”[MeSH Terms] OR “health promotion”[Title/Abstract] OR “health behavior”[Title/Abstract] OR “health behavior”[Other Term] OR “health behavior”[Other Term] OR “prevention”[Other Term] OR “prevention”[Title/Abstract] OR “intervention”[Title/Abstract] OR “intervention”[Other Term] OR “educat*”[Title/Abstract] OR “educat*”[Other Term]
2 Stroke	“poststroke”[Title/Abstract] OR “poststroke”[Other Term] OR “post stroke”[Other Term] OR “post stroke”[Title/Abstract] OR “cerebrovasc*”[Title/Abstract] OR “cerebrovasc*”[Other Term] OR “brain vascular”[Other Term] OR “brain vascular”[Title/Abstract] OR “cerebral vascular”[Title/Abstract] OR “cerebral vascular”[Other Term] OR “cerebrovascular disorders”[Other Term] OR “cerebrovascular disorders”[Title/Abstract] OR “cerebrovascular disorders”[MeSH Terms] OR “cerebrovascular disease”[Title/Abstract] OR “cerebrovascular disease”[Other Term] OR “brain ischemia”[Other Term] OR “brain ischemia”[Title/Abstract] OR “stroke”[Title/Abstract] OR “stroke”[Other Term] OR “stroke”[MeSH Terms] OR “brain infarction”[MeSH Terms] OR “brain infarction”[Other Term] OR “brain infarction”[Title/Abstract] OR “stroke*”[Title/Abstract]/OR “stroke*”[Other Term]
3 #1 AND #2	(“poststroke”[Title/Abstract] OR “poststroke”[Other Term] OR “post stroke”[Other Term] OR “post stroke”[Title/Abstract] OR “cerebrovasc*”[Title/Abstract]/OR “cerebrovasc*”[Other Term] OR “brain vascular”[Other Term] OR “brain vascular”[Title/Abstract] OR “cerebral vascular”[Title/Abstract] OR “cerebral vascular”[Other Term] OR “cerebrovascular disorders”[Other Term] OR “cerebrovascular disorders”[Title/Abstract] OR “cerebrovascular disorders”[MeSH Terms] OR “cerebrovascular disease”[Title/Abstract] OR “cerebrovascular disease”[Other Term] OR “brain ischemia”[Other Term] OR “brain ischemia”[Title/Abstract] OR “stroke”[Title/Abstract] OR “stroke”[Other Term] OR “stroke”[MeSH Terms] OR “brain infarction”[MeSH Terms] OR “brain infarction”[Other Term] OR “brain infarction”[Title/Abstract] OR “stroke*”[Title/Abstract]/OR “stroke*”[Other Term]) AND (“health education”[MeSH Terms] OR “health education”[Title/Abstract] OR “health education”[Other Term] OR “health promotion”[Other Term] OR “health promotion”[MeSH Terms] OR “health promotion”[Title/Abstract] OR “health behavior”[Title/Abstract] OR “health behavior”[Other Term] OR “health behavior”[Other Term] OR “prevention”[Other Term] OR “prevention”[Title/Abstract] OR “intervention”[Title/Abstract] OR “intervention”[Other Term] OR “educat*”[Title/Abstract]/ OR “educat*”[Other Term])

on the format, timing, route of delivery, or characteristics of the resources. Stroke education is defined as the provision of information, regardless of preventive approaches or clinical indication.

2.5 | Outcomes

This scoping review did not establish predetermined outcomes and anticipated a significant degree of heterogeneity. The variables of interest encompassed various education types (e.g., face-to-face, group education, campaigns) and settings (e.g., community, hospital, mass media). Whenever feasible, clinical outcomes were gathered and synthesized to evaluate the efficacy of the educational intervention, including stroke knowledge, identification of stroke signs and symptoms, and calling 911.

2.6 | Data Charting

A single researcher meticulously recorded all data from qualifying papers using a semi-structured charting pro-forma specifically designed for this study. For each eligible study, narrative summaries were generated and subsequently evaluated for concurrence by an independent investigator. To ensure comprehensive data collection, related developmental

studies were scrutinized from reference lists. Any inconsistencies in data were diligently addressed through additional review and discussion among investigators.

2.7 | Statistical Analysis

A presentation of a narrative synthesis of data gathered from eligible papers is provided.

3 | Results

3.1 | Study Characteristics

A review of 97,848 papers was conducted, resulting in the inclusion of 19 papers (Figure 1) from various geographical regions, including Asia, Australia, Europe, and America. Of these, six were randomized controlled trials (RCTs) [5, 6, 13–16], six were non-randomized studies [14, 17–21], five were campaign studies [22–26], one was a cross-sectional study [27], one was a pilot study [28], and one was a prospective study [29]. The majority of studies ($n=16/19$) involved education for several months (i.e., 2 months to 4 years). A full outline of educational designs is shown in Table 2.

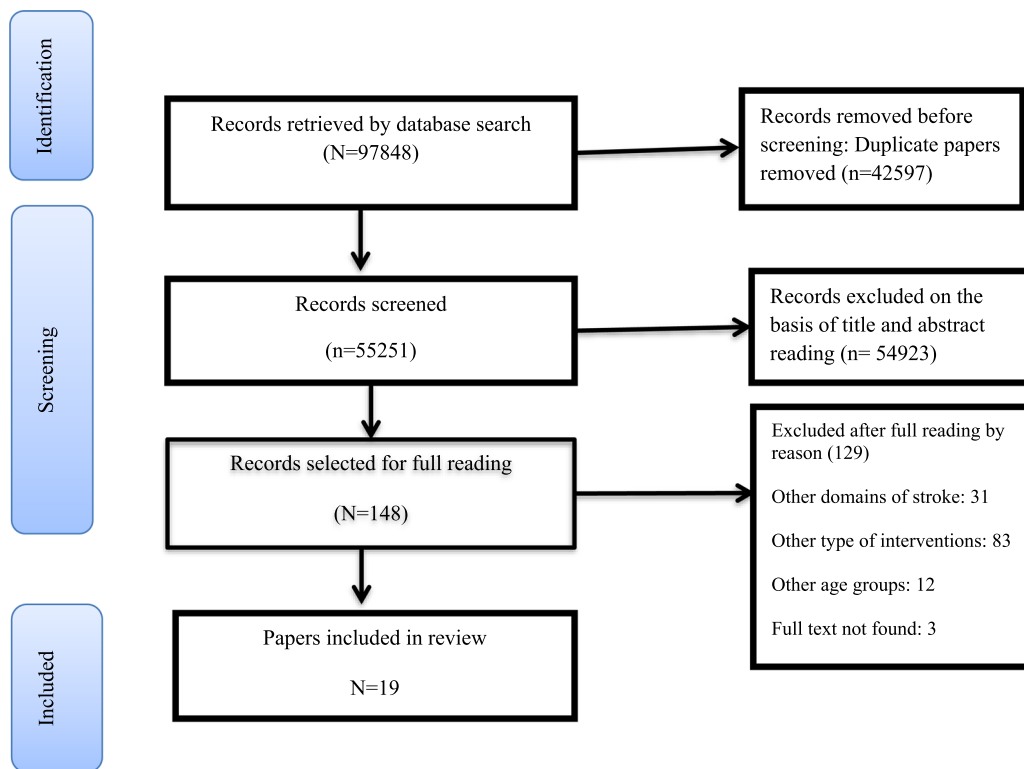


FIGURE 1 | Study selection process.

3.2 | Subjects of Educational Interventions

The provided information describes various interventions and educational programs related to stroke awareness, prevention, and management (see Table 3).

3.3 | Awareness of Warning Signs and Symptoms of Stroke

The papers reported signs and symptoms of stroke ($n = 14$) [6, 13, 14, 20–22, 24–29]. Several interventions and campaigns aimed at raising awareness of stroke symptoms and promoting timely medical intervention have been described as comprehensive awareness campaigns, multilevel strategies for stroke education, community-based nursing education, and rehabilitation programs.

3.3.1 | Comprehensive Awareness Campaigns

The comprehensive campaigns were conducted to raise awareness about stroke symptoms and the importance of timely medical intervention. An intervention campaign was conducted to increase public awareness by the National Stroke Foundation (NSF) in Australia. The campaign used the acronym FAST (Face, Arm, Speech, Time) to raise awareness about stroke symptoms [24]. A study aimed to reduce the time from stroke onset to hospital arrival, as early intervention can significantly improve outcomes. By utilizing television PSAs, newspaper advertisements, and conducting public screenings, these interventions employed a mix of visual and interactive methods to educate the public about stroke symptoms and the need for

swift action [23, 25, 26]. Long, intermittent campaigns are effective in increasing the public's awareness of the warning signs of stroke [23]. An educational campaign utilized posters and advertisements centered around the FAST mnemonic, emphasizing the primary symptoms of stroke: facial drooping, arm weakness, speech difficulties, and the importance of time. To enhance accessibility and avoid reliance on acronyms, the campaign opted for vivid visual representations. Both posters and television advertisements featured actors portraying the mentioned symptoms, providing a tangible and memorable depiction of the warning signs of stroke. This approach aimed to increase public awareness and understanding of stroke symptoms while avoiding potential confusion associated with acronym usage [29]. Campaigns used various approaches involved the use of mass media such as television, radio, print media, internet, and posters [22–26]. Other used approaches include public service announcements [23, 25], advertisements, and presentations in public events [24].

3.3.2 | Multilevel Strategies for Stroke Education

A short 1-h stroke education program was conducted with hospitalized stroke survivors before their discharge. The program consisted of two sessions. The first session focused on educating patients about the disease process of stroke and its warning signs [28]. The study aimed to evaluate stroke education during hospitalization and assess knowledge retention in patients returning for a 1-month follow-up in two pilot phases. In Pilot A, only 25% of 198 participants scored 100% on required stroke education items, with the most common incorrect answers related to “personal risk factors for stroke” and an inability to identify stroke signs and symptoms. In Pilot

TABLE 2 | Summary of studies.

Author	Year	Country	Design	Duration of intervention	Setting/procedure
Advani et al. [29]	2016	Norway	Prospective analysis	1 month	All patients admitted to the emergency room before, during, and after the mass media intervention
Aguirrezabal et al. [17]	2013	Spain	Nonrandomized, controlled trial	2 years	Rehabilitation hospital
An et al. [5]	2018	USA	RCT	4 months	Two senior centers
Becker et al. [25]	2001	USA	Campaign	4 months	Residents of King County
Bek et al. [16]	2016	United Kingdom	RCT	10 weeks	Local community
Bray et al. [24]	2011	Australia	Longitudinal Campaign	Awareness campaigns from 2004 to 2009 (annually in Stroke week)	Metropolitan Melbourne
Delemos et al. [20]	2003	USA	Quasi-experimental	3 months	Community dwellings
Heuschmann et al. [26]	2021	Germany	Campaign	6 months	Berlin community, multimedia
Hodgson et al. [23]	2009	Canada	Campaign	9 months campaign	Mass media
Johnson et al. [13]	2018	USA	RCT	Pilot A: 30 ± 14 days from the time of receipt of CMS-required hospital education	Centers for Medicare and Medicaid (CMS), Stroke Clinic
Jurkowski et al. [22]	2010	USA	Campaign	2 months	Upstate New York counties Albany, Schenectady, and Rensselaer
Lynch et al. [6]	2016	Australia	A cluster randomized trial design	14-month period	Ten hospitals
Rausch and Turkoski [28]	1999	USA	Pilot study	1 day	A major metropolitan hospital
Smith et al. [15]	2004	USA	RCT	2 years	Stroke rehabilitation unit
Song and Nam [19]	2015	USA	Quasi-experimental	9 months	Community dwellings
Tang et al. [21]	2015	Taiwan	Quasi-experimental	20 weeks	Cardiologist's outpatient office
Visaria et al. [18]	2020	USA	Interventional	2014–2017	South Asian population in the United States
Wang et al. [14]	2013	Taiwan	Quasi-experimental	From August 2007 to June 2008 (8-week intervention)	Medical center and seven municipal communities, central Taiwan, Taichung
Zhang et al. [27]	2020	China	Observational study	12 months	Stroke treatment hospital

TABLE 3 | Findings of the studies.

Author	Participants	Interventions	Measures and results
Advani et al. [29]	Patients admitted to the emergency room	Advertising on television, posters, and advertising on social media and healthcare trust websites. The posters and advertisements were based on the FAST mnemonic and focused on the primary symptoms of stroke.	Determine the number of acute stroke admissions within 4.5 h of symptom onset. Increased IVT treatment rate from 7.3 to 11.3 patients, the number of suspected acute stroke admissions to the emergency room increased from 37.3 to 72.8 patients per month.
Aguirrezabal et al. [17]	Patients diagnosed with a first-ever stroke in the absence of other neurological disorders or musculoskeletal disabling diseases	A single educational 2-h session with the physical, cognitive, occupational, and speech therapies program consisting of daily 3-h interventions, consisted of an information and carer training class in the neurorehabilitation unit, managed by a specially trained multidisciplinary team, a video was projected to help	Effect of a post-stroke information and carer training intervention provided on patient and carers' satisfaction.
An et al. [5]	Korean Americans older adults (Mean age = 71.49 y)	8-week primary stroke prevention program based on the self-efficacy theory, 1-h sessions that included 30- to 40-min in-person lectures and 20 to 30-min group discussions.	Stroke knowledge was measured using a 25-item stroke knowledge test. The greater improvements in stroke knowledge and intake of sodium and total fats in the intervention group than control group.
Becker et al. [25]	> 4 y	The educational intervention consisted of public service announcements with several different types of media Television different signs and symptoms of stroke, know the symptoms, Call 911, advertisements in newspapers (six one-half-page).	A significant increase in stroke knowledge, 52% more likely to know a risk factor for stroke and 35% more likely to know a symptom of stroke after the campaign.
Bek et al. [16]	Adult stroke survivors (34–85 y) (n = 82)	The Conductive Education program consisted of weekly 1.5 h, within each session, fine and gross motor skills were practised within task series, which were carried out in lying, sitting, and standing positions.	The trial was feasible.
Bray et al. [24]	—	The FAST campaign included television and radio advertisements and displaying posters in public places (e.g., shopping malls). Dispatch system has provisions to determine and dispatch paramedics for a possible “stroke.”	A significant increase in October (all years) was only detected since the call an ambulance message was added to FAST.
Delemos et al. [20]	Participants in community stroke screening (73 y) (n = 78)	Health screening, counseling, and education	Knowledge of stroke warning signs increased from 59% to 94% after screening but decreased to 77%.
Heuschmann et al. [26]	General public (above 55 y) and professionals	Mass media campaigns named, stroke signs and symptoms and correct action by various approaches, including print	A reduction in delay to hospitalization and an increased uptake of EMS

(Continues)

TABLE 3 | (Continued)

Author	Participants	Interventions	Measures and results
		media, local broadcast, internet and poster presentation, scientific lectures open to the general public or targeted at healthcare professionals, cultural events, and presentations in public events.	were observed over the study period for both regions. No detectable effect of the campaign was observed.
Hodgson et al. [23]	45 y and over	Nine random-digit dialing telephone survey, An average of 9.7 times, estimated total of 26.5 million exposures, black-and-white advertisement (streaming video). In 2007, the advertisement was translated into Cantonese, Mandarin, Hindi, Punjabi, Tamil, and Urdu and time was purchased on ethnic-specific television programs.	Strong and significant effect on ED presentations when the advertising campaigns were long; when the advertising campaigns were shortened. there was no campaign effect.
Johnson et al. [13]	Patients and primary caregivers (28–97 y)	Pilot A delivered CMS-required stroke education during hospitalization in a standardized manner and tested knowledge retention in patients returning to the Stroke Clinic for 1-month follow-up; Pilot B randomized patients to either a control group with standardized education or a test-enhanced learning group	Pilot A: to understand stroke knowledge retention, emergent response to stroke.
Jurkowski et al. [22]	Adults aged 30 years or older	Stroke awareness media campaign. Four focus groups participants were recruited using the Markette Research database of contacts and through referrals.	There was a significant increase between baseline and follow-up in intention to call 9-1-1 for the four-stroke symptoms.
Lynch et al. [6]	586 patients (30–97 y)	Education-only intervention: single onsite education session and provision of printed educational resources. The multifaceted intervention was spaced over 1–2 weeks and included two onsite education sessions.	
Rausch and Turkoski [28]	Hospitalized stroke patients	The educational program consisted of two one-on-one sessions between the educator and stroke survivor on the same day with a 1-h break between sessions.	Effectiveness of patients' knowledge attainment and behavioral modification after short, 1 h, nurse–patient education interactions. Patient knowledge of the disease process of stroke and risk factors and knowledge of lifestyle modification behaviors.
Smith et al. [15]	Patients with a diagnosis of acute stroke (31–91 y).	Patients and carers randomized to the education program were given a copy of the Stroke	Knowledge of stroke measured by a questionnaire developed for this study.
Song and Nam [19]	Adults with prehypertension living in the community (40–64 y).	Stroke risk self-management intervention consisted of three weekly, 2-h, face-to-face sessions and two booster telephone sessions, utilizing strategies to enhance motivation for	Stroke risk awareness and preventive lifestyle.

(Continues)

TABLE 3 | (Continued)

Author	Participants	Interventions	Measures and results
		behavioral changes based on the Self-Determination Theory. The 1-month and 3-month postintervention assessments were conducted by telephone.	
Tang et al. [21]	Hypertension patients center (35–60 y)	Health education CD-ROM and printed about stroke prevention	Brain anatomy and function, types of strokes, risk factors for stroke, symptoms of stroke, prevention of stroke, and correct management of the onset of stroke.
Visaria et al. [18]	People (30–80 y)	22 sessions, two 3-h educational sessions that occurred at least 1 week apart.	Effectiveness of a Cultural Stroke Prevention Program
Wang et al. [14]	Patients with mild stroke (41–84 y)	A community-based stroke nursing education and rehabilitation program was comprised of two stroke educational sessions, communication seminars, alternating with patient support groups.	Assessing stroke knowledge, behavior, and self-efficacy. The stroke patients in two groups were assessed at baseline, after intervention, and at the 6-month follow-up.
Zhang et al. [27]	519 patients with acute ischemic stroke (29–94 y)	A combination of multi-level education. Community doctors and primary hospital doctors enter the community for acute stroke education and distribute stroke treatment manuals once a week. Media, we-media, television, internet, and other channels are used to promote stroke knowledge.	Degree of stroke recognition or Stroke awareness (five aspects of stroke identification, stroke first aid method, patient transport route, awareness of intravenous thrombolysis, intravenous thrombolysis time window, awareness of intravascular mechanical thrombus).

B, the test-enhanced learning group showed significantly better performance in identifying personal stroke risk factors (100% vs. 67%) and understanding the purpose of secondary prevention medications (87% vs. 40%) compared to the control group. The findings suggest that traditional stroke education during hospitalization may have poor retention, leading to the proposal of the Targeted Education in Stroke Trial (TEST) to investigate the impact of novel teaching methods, particularly test-enhanced learning, on patient/caregiver knowledge retention [13]. The stroke education session during hospitalization covered various topics, including brain anatomy and function, types of strokes, risk factors, symptoms, prevention, and proper management of stroke onset. The entire session took approximately 20 min to complete [21]. The campaigns included various strategies such as television and radio advertisements, posters in public places, distribution of leaflets and wallet cards, and heavy promotion in the city of Melbourne. The effectiveness of these campaigns was evaluated by examining the impact on ambulance dispatches for stroke in Melbourne [24]. Zhang et al. [27] described approach reflects a multi-level strategy for stroke education, involving healthcare professionals, community outreach, educational materials, and various media channels.

3.3.3 | Community-Based Nursing Education and Rehabilitation Program

A community-based stroke nursing education and rehabilitation program demonstrated effectiveness in improving participants' recognition of stroke warning signs, increasing from 59% to 94% [20]. A study evaluated a community-based stroke nursing education and rehabilitation program for patients with mild stroke that involves assessing various components and signs of stroke to determine its effectiveness [14]. In separate papers, patients and caregivers were randomly assigned to participate in an educational program. They were provided with a Stroke Recovery Program manual and were invited to attend specially arranged meetings with their multidisciplinary team. As part of the evaluation process, assessments were conducted at 3 and 6 months to determine the impact of the program on Anxiety, Depression, Barthel Index, Timed Up and Go test, Stroke Impact Scale, London Handicap Scale, and Frenchay Activities Index. These assessments provided insights into the effectiveness and outcomes of the programs [14, 15]. In another study, patients followed a multidisciplinary inpatient comprehensive stroke rehabilitation (RHB) program consisting of daily 3-h interventions (physical, cognitive, occupational, and speech

therapies). It consisted of an information and carer training class in the neurorehabilitation unit, managed by specially trained members of the multidisciplinary RHB team (nursing, occupational therapy, and physiotherapy), a video was projected to help patients and carers acquire knowledge about stroke and its RHB, as well as skills to enable their return home and social resources to support adaptation to the new situation. A telephone number and e-mail address were also available so that patients and carers could contact the RHB team to solve any questions that could arise after hospital discharge. In the following dimensions, the effectiveness of the interventions over the control group: amount of therapy, satisfaction levels ranges, information received about home help and social facilities, satisfaction with the amount of contact maintained with the hospital after discharge including information provided, training received the possibility of contact with the RHB team after hospital discharge [16].

3.3.4 | Multimedia Campaign for 9-1-1 Awareness

A multimedia campaign aimed at increasing stroke symptom awareness and promoting the need to call 9-1-1 for immediate medical assistance [13, 22, 25].

3.3.5 | Self-Management Interventions

A stroke risk self-management intervention was conducted among adults with prehypertension residing in the community. The intervention comprised of three face-to-face sessions, each lasting for 2 h, conducted on a weekly basis. Additionally, two booster telephone sessions were provided to the participants. The intervention aimed and enhanced stroke risk awareness, preventive lifestyle, healthy diet, motivation for behavioral changes, drawing upon the principles of the Self-Determination Theory. Post-intervention assessments were conducted at the convenience of the participants, via telephone, at both the 1-month and 3-month marks [18].

Stroke prevention education programs have shown significant effectiveness across various metrics. Mass media interventions increased the IVT treatment rate from 7.3 to 11.3 patients per month and suspected acute stroke admissions to the ER by 97% (from 37.3 to 72.8 patients per month), while stroke symptom recognition rose from 66% to 75% [29]. Over 80% of patients were satisfied with the information, care, and therapy received during hospitalization [17]. In-person education improved stroke knowledge and reduced sodium and total fat intake more in the intervention group than in the control group [17]. A community-based campaign in King County saw a 52% increase in awareness of stroke risk factors and a 35% increase in symptom recognition post-campaign [25]. Knowledge of stroke warning signs increased from 59% to 94% post-screening but decreased to 77% after 3 months [20]. Long advertising campaigns had a strong effect on ED presentations, while shorter campaigns did not [23, 26]. In Pilot A, only 25% of participants scored 100% on stroke education, but Pilot B showed significant improvements in identifying personal stroke risk factors and the purpose of secondary prevention medications [13]. There was a notable increase in the intention to

call 9-1-1 for stroke symptoms post-intervention [22]. However, multifaceted interventions were not more effective than education-only approaches in assessing rehabilitation needs [6]. Short-session teaching improved knowledge but not behavior, indicating the need for new teaching strategies [28]. Psychological measures improved significantly in both VRG and ETG patients, with VRG showing more substantial improvements [30]. The experimental group showed higher stroke knowledge and cognition than the control group [21]. Questionnaire scores improved modestly, with younger participants showing greater increases [18]. The intervention group showed long-term improvements in knowledge of stroke risk factors, social participation, and self-efficacy [14]. Multi-level education significantly improved awareness and clinical outcomes, encouraging more patients to use EMS [27].

4 | Discussion

Education on stroke is crucial for preventing and controlling complications, however, limited review studies have examined how to optimize this for adults and older individuals. This review outlines various educational interventions, including campaigns, group training, face-to-face, newspapers, and mass media. While outcomes varied, most studies demonstrated knowledge promotion. The primary outcome was typically awareness of stroke signs and symptoms, with clear relevance to those familiar with emergency numbers.

The teaching methods approach was usually hybrid and involved the use of members of the public working in joint roles. For adults, especially older adults, education before strokes occurs is important for several reasons. First, appropriate and timely information about stroke has been shown to increase the likelihood of treatment [31]. This is undoubtedly important for the quality-of-life depression mood of individuals and their families before and after a stroke, but it is also likely to reduce physiological complications [32, 33]. Previous studies have shown that an appropriate environment and community regarding stroke symptoms is associated with increased early detection and subsequent appropriate treatment [34, 35]. Second, appropriate information is important for maximizing the retention of knowledge and for optimizing adults' compliance to recovery goals [36]. Previous studies have shown that unawareness of stroke symptoms is associated with increased postponement of referring to the emergency department and complications may be associated with poor healing [37, 38].

The implementation of varied stroke education models has been linked to reduced resource utilization and decreased healthcare costs. Some training approaches have been found to enhance individuals' ability to make critical decisions during acute situations. Campaigns, for instance, have raised greater harmony between patients and their families regarding stroke risk understanding [39]. Therefore, it is vital to raise awareness and provide training to optimize performance in important circumstances. Previous qualitative evidence has demonstrated that training with a control group can effectively improve individuals' awareness and knowledge of stroke, thereby preventing complications and facilitating their reintegration into daily life.

Along with the current findings that show that education has an effective role in improving people's awareness, it is clear that people, especially older people, should be partners in the development of effective information resources. A key strength is the broad inclusion of study designs. On the other hand, a key limitation is the wide range of topics and the difficulty in making meaningful comparisons between studies. Acknowledging this heterogeneity, both in intervention design and study methods, a narrative synthesis represents the most practical synthesis of data, especially as the study aims to describe previous evidence and identify opportunities for future research. Another limitation is the specific nature of stroke education in individuals, and particularly in older adults, of this study rather than other treatment or rehabilitation interventions that have been conducted extensively. This was desirable because there are unique considerations such as the reduction of functional capacities, the ever-increasing development of technologies and communication channels and the older adult's lack of attention to them, the illiteracy of older individuals compared to other age groups for people, especially the older adults [40]. Although some of the findings described by the current data can be applied to different areas and stroke education, generalization of these results is not recommended. In summary, the provision of stroke education information and its outcomes to support effectiveness in different communities needs further investigation due to the heterogeneity of older people [41]. While recommending education before a stroke occurs is justified. A key challenge is the development of evidence-based information sources. These should be developed based on academic and local principles of information design and cognitive understanding. The most appropriate outcomes for measuring resource effectiveness must be agreed upon and may not necessarily include the opinion of medical professionals. In all these cases, it is clear that key stakeholders, including older people and healthcare professionals, need to be closely integrated with future research [42].

Individuals in catastrophic situations often avoid care centers, resulting in delays in treatment. During the COVID-19 pandemic, there was an increase in risk factors [43] for cerebrovascular diseases, yet prevention and control strategies did not proportionally strengthen. Stroke patients were frequently excluded from educational and prevention programs as well as rehabilitation therapies due to fears of infection in hospitals. The impact of COVID-19 on stroke care continued to be felt even after the pandemic. It is crucial to align pandemic strategies with accessibility to stroke programs to ensure that all patients receive the best possible care [44].

To apply the findings of this study into clinical practice, healthcare providers should integrate comprehensive stroke education programs into their routine care protocols, especially emphasizing their importance during times of crisis such as pandemics. Clinicians should actively promote awareness of stroke symptoms and encourage timely medical attention, utilizing various communication channels to reach diverse patient populations. Adapting care delivery models to include remote or virtual options can help maintain access to education and rehabilitation services when traditional healthcare settings are less accessible. Additionally, aligning stroke prevention and educational efforts with broader public health strategies ensures

continuity of care during emergencies. Regular assessment and adaptation of these programs based on patient feedback and emerging evidence will further enhance their effectiveness and responsiveness to patient needs.

4.1 | Limitations

Research on the education of professionals and media personnel involved in stroke prevention education is currently lacking. It is crucial to ensure that these individuals are adequately prepared to deliver effective educational content. Furthermore, many existing studies fail to represent a wide range of populations, including various ethnic groups, socioeconomic backgrounds, and geographic areas. This limitation restricts the applicability of the findings and underscores the necessity for more inclusive research efforts. Additionally, there is a pressing need for comparative studies on different educational methodologies to identify the most effective strategies for diverse populations. The role of technology in educational interventions also remains insufficiently examined, because a significant portion of the elderly population has limited literacy when it comes to utilizing technologies, including smartphones. Lastly, there is a scarcity of long-term studies that evaluate the enduring effects of educational interventions on stroke prevention, as most research tends to concentrate on short-term results, leaving a significant gap in our understanding of the long-term advantages and adherence to these programs.

5 | Conclusions

This scoping review meticulously examined a vast array of educational programs and interventions targeting stroke knowledge enhancement among adults aged 30 years and above, with a specific emphasis on older adults. The comprehensive literature search yielded 19 pertinent papers, encompassing a diverse range of study designs, including randomized controlled trials, non-randomized studies, campaign studies, cross-sectional studies, pilot studies, and prospective studies. The synthesized findings shed light on a multifaceted landscape of stroke education initiatives, encapsulating crucial aspects such as awareness of warning signs and symptoms, comprehensive awareness campaigns, multilevel strategies for education, community-based nursing education and rehabilitation programs, multimedia campaigns for 9-1-1 awareness, and self-management interventions. This scoping review not only consolidates existing knowledge but also serves as a valuable resource for practitioners, policymakers, and researchers interested in the diverse strategies employed to enhance stroke knowledge.

Author Contributions

Mehdi Abbasian: conceptualization, investigation, writing—original draft, Methodology. **Hosna Rashidi Birgani:** investigation, methodology, writing—original draft. **Roghayeh Khabiri:** investigation, methodology, writing—review and editing, data curation. **Leila Namvar:** conceptualization, methodology, writing—review and editing. **Leila Jahangiry:** conceptualization, writing—original draft, methodology, validation, supervision, data curation, writing—review and editing.

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Disclosure

The lead author Leila Jahangiry affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Ethics Statement

The current study was approved by the Committee of Ethics of Tabriz University of Medical Sciences (IR.TBZMED.VCR.REC.1399.018, ID: 64142) and conducted according to the ethical norms and guidelines. The authors also confirmed the ethical instructions were implemented in the method.

Consent

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

The data collection tools and datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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