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Stroke health literacy: a narrative review of assessment tools and improvement strategies

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ABSTRACT

Background: Stroke is a serious life-threatening health condition. Prevention, treatment, and rehabilitation for stroke rely heavily on stroke health literacy, which refers to health literacy regarding stroke and stroke literacy.

Objectives: The objectives of this review were to investigate stroke health literacy and summarize into 3 main topics: 1) assessment tools for stroke health literacy; 2) stroke health literacy levels in various populations; and 3) strategies to improve stroke health literacy.

Materials and methods: A comprehensive search of the English literatures published between 2011-2021 was conducted using PubMed and Scopus databases. All studies relevant to stroke health literacy regardless the study types were included.

Results: Total of fourteen studies complied with the criteria were included in a review. As a results, nine assessment tools for stroke health literacy were found (four for health literacy and five for stroke literacy). Stroke health literacy was insufficient in the general population, the population at high risk for stroke, and patients with stroke. Some strategies to improve stroke health literacy were revealed, consisted of two stroke educational programs for patients with stroke and one educational program for the general population.

Conclusion: To conclude, there is very limited knowledge about stroke health literacy in terms of assessment tool, and improvement strategy. Further research is needed in order to expand knowledge and increase comprehension regarding stroke health literacy, and thus improve preventive, curative, and rehabilitative outcomes.

Introduction

Health literacy (HL) is the ability to access, understand, evaluate, and communicate information to promote, maintain, improve health in a variety of settings across the life course, and to apply health information to make appropriate health decisions.[1,2] HL hierarchy is built upon the degree of literacy in health, ranging from basic to advanced, namely, functional, communicative, and critical literacy.[3] Media literacy has been added in some studies based on the hypothesis that media also affect health perception and personal health management.[4] Inadequate HL leads to poor health knowledge, medication nonadherence, an inability to use health information for self-management and health service access, low disease prevention compliance, early health problem development, frequent hospitalization, and poor health outcomes.[5-7]

Stroke is the second leading cause of death and the third leading cause of disability.[8] Approximately 5.5 million people die from stroke each year, and more than 116 million years of healthy life are lost due to stroke-related mortality and disability.[8] The incidence of stroke is increasing,

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particularly in low- and middle-income countries. More than 13.7 million new strokes are estimated each year. Of these, almost 60% occur in people under 70 years of age.[8] Stroke is classified into three subtypes based on different causes: 1) ischemic stroke, 2) hemorrhagic stroke, and 3) subarachnoid hemorrhage stroke. Among these, ischemic stroke is the most common.[9] Some stroke survivors have consequences depending on the stroke type, severity, and brain lesion location, for example, motor control impairment, perceptual deficit, cognitive deficit, communication problems, and emotional problems. Long-term disability or some degrees of impairment usually persists, and rehabilitation is required to improve function, prevent further complications, and reduce possible health problems.

HL plays a crucial role in stroke prevention and rehabilitation. Sufficient HL lessens stroke severity and improves treatment and rehabilitation outcomes.[10] Stroke patients with adequate HL can access and use health information for self-management, rehabilitation compliance and the prevention of complications. Furthermore, stroke literacy, or specific knowledge regarding stroke, including stroke symptoms, stroke risk factors and appropriate response to the occurrence of stroke, is important in stroke prevention and care.[7,11-13] Poor stroke literacy leads to delayed hospital arrival and failure to provide proper stroke care.[11]

There were some studies regarding HL in stroke high-risk population in Thailand. The first study was one-group experimental research to examine the level of HL for stroke, before and after received HL development program among stroke high-risk group (hypertension patients) and their family caregivers. Contents of the development program in this study consist of stroke warning signs, stroke symptoms and access to emergency medical service. The result demonstrated a positive correlation between HL and health behavior both in stroke high-risk group and family caregivers. However, there was no significant correlation between HL of family caregivers and health behavior of stroke high-risk patients. These results lead to the conclusion that HL development program was effective in improving HL level and should be implemented in both current and new patients with hypertension.[14]

The second study was a research and development study, with aims to develop and evaluate the effectiveness of the HL development model for stroke prevention among stroke high-risk patients at primary care units. The developed model in this research consisted of four main processes: 1) promoting the cooperation of health team administrators and network partners in primary care units, 2) strengthening HL in preventing stroke of high-risk patients, 3) conducting continuously home visit by public health volunteers and caregivers, and 4) providing consultation and evaluation in provincial, district, and sub-district levels. After the experiment, the participants had higher HL score in stroke prevention, risk awareness, warning symptoms and preliminary risk assessment. The researchers then concluded that the provincial public health office and related agencies should provide sufficient resources as well as strengthen the health teams and network partners at the primary level.[15]

This narrative review aimed to investigate knowledge of stroke health literacy (SHL), which refer to the combination of HL regarding stroke and stroke literacy and summarized this knowledge into 3 main topics: 1) assessment tools for SHL; 2) SHL levels in patients with stroke, the population at high risk for stroke, and the general population; and 3) interventions to improve SHL and their effectiveness.

Materials and methods

A narrative review provides recent knowledge about specific topics without a description of methodological approaches.[16] The steps include 1) developing the research question, 2) identifying search terms, 3) identifying databases, 4) searching the literature, 5) evaluating the literature, 6) extracting data, 7) analyzing the data, and 8) interpreting and synthesizing the findings.

Data sources

A literature search was conducted using PubMed and Scopus databases. The search terms were "stroke/ cerebrovascular accident", "health literacy", and "stroke literacy". Only studies published in the English language between 2011 and 2021 were included.

Study selection

The first author screened the titles and abstracts (Figure 1). Articles not related to SHL, and duplicates were excluded. The first author reviewed the full-text articles and, in consultation with the second author, removed articles which did not meet the following inclusion criteria: 1) studied SHL, 2) were written in the English language, and 3) were published between 2011 and 2021.

Data extraction

Data were extracted from all included studies in order to summarize the variation and detail of each study. The first author and the second author developed the scopes for data extraction: study objectives, participants' characteristics, research context, assessment tools' characteristics, interventions, outcomes, strengths, and limitations. The first author extracted the data and discussed the results from data extraction with the second author.

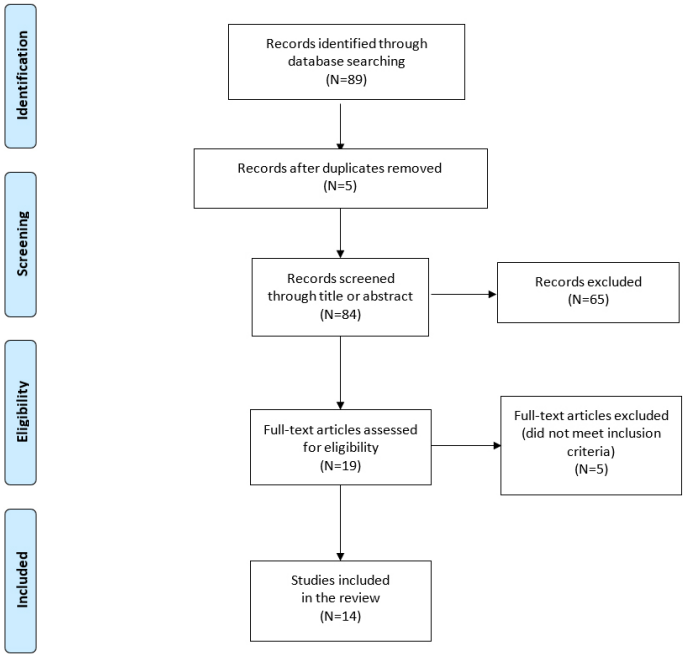

Figure 1 *Summary of study selection.*

Results

The initial search resulted in 89 articles. Of these, 5 were duplicates, and 65 were not related to SHL. After the exclusion of 5 additional articles due to unmet inclusion criteria, 14 articles were included in the review (Figure 1). Detailed descriptions of the characteristics and outcomes of the included studies were presented in Table 1.

Assessment tools for stroke health literacy

A total of nine assessment tools related to SHL were found, consisted of four tools for HI assessment, and five tools for stroke literacy assessment. Among the HL assessment tools, only one was specifically developed for stroke, while the rest were adapted from general HL assessment tools.

Health literacy assessment tools

The health literacy battery for three phases of stroke (HL-3S) was the only assessment tool developed specifically for patients with stroke.[21] HL-3S has three question categories: 1) health care tests for the acute phase (10 questions), 2) disease prevention tests for the subacute phase (10 questions), and 3) health promotion tests for the chronic phase (10 questions). Tests of the tool's psychometric properties with 422 stroke patients showed high validity and reliability. Findings from the principal component analysis (PCA) reported eigenvalues of the first component between 1.51-1.57, interitem residual correlations between 0.00-0.29 and Rasch reliability coefficients between 0.86-0.87. An advantage of the HL-3S is its appropriateness in assessing patients according to stroke phases.

There were three assessment tools that were adapted to assess HL in stroke patients: a Mandarin version of the short-form health literacy scale (SHEAL),[18] a Mandarin version of the European health literacy survey questionnaire (HLS-EU-Q),[10] and the health literacy assessment using talking touch screen technology (Health LiTT).[19] The original SHEAL comprises 11 multiple-choice items, of which 3 items are used for numeracy skill assessment and 8 items are used for comprehension ability assessment.[26] Huang et al. tested the Mandarin version of the SHEAL with 87 stroke patients.[18] It was found to be valid and reliable (Cronbach's alpha of 0.82). This instrument showed a high correlation with the Public Stroke Knowledge Quiz (PSKQ) (r coefficient of 0.62, $p<0.001$). The findings showed a ceiling effect, which limited the instrument's ability to distinguish the investigated variables in a high HL group. Therefore, the instrument needs further revision to improve its internal consistency reliability and discriminative validity, particularly in patients with high HL. Three years after the publication of the SHEAL study, the same authors tested the psychometric properties of a Mandarin version of the HLS-EU-Q in patients with stroke.[10] HLS-EU-Q comprises 47 questions with a Likert scale assessing patients' competencies to access, understand, appraise, and apply health information for health care, disease prevention, and health promotion. For the Mandarin version of the HLS-EU-Q, 311 patients with stroke completed the questionnaires. The findings showed a Rasch model fit with 12-domain structures. Huang et al.[10] recommended using the instrument to assess HL in patients with stroke. The last HL assessment tool used in patients with stroke was the health LiTT, a multimedia, self-administered test.[19] The original version of the health LiTT has 82 items. Hahn et al used a short form of the health LiTT comprising 16 items on prose, document, and quantitative health information.[19] The psychometric properties of this version were not described, although the original version of the health LiTT revealed validity and high reliability.[27]

Table 1 Summary of included studies.

Authors (year)	Objectives	Participants	Assessment tools	Result/Main outcomes
Stroke health literacy assessment in the general population				
Akiyama *et al*[17] (2013)	To assess stroke knowledge in the Japanese population	11,121 Japanese individuals from across Japan Mean age: 44.8 years (range 20-69 years)	Internet-based questionnaire survey	The respondents' knowledge of stroke was considered insufficient; knowledge was higher in older respondents than in younger respondents.
Lim *et al*[18] (2014)	To evaluate the level of stroke literacy in citizens of Singapore	687 Singaporean citizens and permanent residents living in a public housing estate Age ≥21 years, Mean age: 48 years	Interviews (face-to-face) using open-ended questions (modified SAQ)	Stroke literacy in the study population was poor, and there was a general lack of awareness of stroke symptoms and risk factors.
Rissado *et al*[19] (2018)	To investigate public stroke literacy in a South Brazilian city	633 normal subjects in a South Brazilian city Mean age: 55.3 years Mean education: 9.6 years	Questionnaires combined with closed- & open-ended questions	Stroke literacy in the South Brazilian city was not adequate.
Zafar *et al*[20] (2020)	To assess stroke literacy in the general population living in the Eastern Province of SA	1,213 respondents Age ≥15 years male 37.6%, female 62.4%	Structured questionnaire distributed through an electronic website over a period of 6 months	Stroke literacy in the population of the Eastern Province of SA was insufficient.
Stroke health literacy assessment in a population at high risk for stroke				
Rolls *et al*[21] (2017)	To investigate the relationships among anticoagulant knowledge, health literacy, and self- reported adherence in patients taking warfarin and DOACs	48 patients with AF Age ≥18 years Mean age: 76.4 years	AKT S-TOFHLA MMAS	Significant correlations were observed among health literacy, DOAC knowledge, and adherence.
Huang *et al*[22] (2015)	To validate a Mandarin version of the SHEAL in stroke patients	87 stroke patients Age ≥20 years, Mean age: 57 years Months after onset <6 months: 24 ≥6 months: 55	Interviews (face-to-face) using the SHEAL and PSKQ	The SHEAL has good psychometric properties and can be used to assess the health literacy of stroke patients for research purposes. However, for clinical context, the SHEAL should be used with caution.
Hahn *et al*[23] (2017)	To evaluate and compare functional literacy, health literacy, fluid cognitive function, and self-reported health in individuals with SCI, stroke, and TBI who live in community dwellings.	209 people with SCI, Mean age: 46 years 184 TBI, Mean age: 40 years 211 Stroke, Mean age: 56 years	Health LiTT WRAT-4	Strong correlations were observed among functional literacy, health literacy, and fluid cognitive function. Higher health literacy was associated with better mobility, less anxiety, and better overall health.
Wang *et al*[24] (2018)	To survey stroke knowledge and influencing factors among people with acute ischemic stroke at discharge in Hubei Province, China	1,531 AIS patients Age ≥18 years Mean age: 65.2 years	Interviews at discharge with a questionnaire.	Most AIS patients had insufficient knowledge at discharge.
Huang *et al*[25] (2018)	To examine the validity of the HLS-EU-Q in patients with stroke using Rasch analysis	311 stroke patients Age ≥20 years Mean age: 59.7 years Median after onset: 9 months	The Mandarin version of the HLS-EU-Q	The HLS-EU-Q (12-domain) is a valid measurement tool for clinicians and researchers to assess health literacy in patients with stroke.
Huang *et al*[26] (2020)	To develop a health literacy battery for three phases of stroke	442 stroke patients Age ≥20 years Mean age: 61.5 years	HL-3S	The HL-3S has a good construct validity and Rasch reliability.
Stroke health literacy interventions				
Williams *et al*[27] (2012)	To assess the effectiveness of child-mediated stroke communication or HHS regarding stroke literacy improvement in parents of children enrolled in an HHS program	71 parents 182 children Age 9-12 years	Stroke Literacy Questionnaire	Parental stroke literacy improved after the program; HHS may be effective as a tool for improving parental stroke literacy.

Table 1 Summary of included studies. (continued)

Authors (year)	Objectives	Participants	Assessment tools	Result/Main outcomes
Stroke health literacy interventions				
Sanders *et al*[28] (2014)	To examine the relationship between health literacy and stroke education outcomes	100 AIS patients males: 57 females: 43 Age ≥60 years: 48% <60 years: 52%	S-TOFHLA SPER	A clear relationship was observed between health literacy and stroke education outcomes.
Denny *et al*[29] (2017)	To assess changes in stroke knowledge,self-efficacy, and satisfaction before and after the intervention.	93 stroke patients in acute hospitals AIS: 65 ICH: 28	10-item questionnaire (written at a 4th grade reading level)	A significant increase was seen in stroke knowledge that lasted until the 30th day after following up. The stroke video intervention served as an adjunct to the verbal and written stroke education.
Szmuda *et al*[30] (2020)	To evaluate the quality, reliability, and audience engagement of stroke-related videos published on YouTube	101 English YouTube videos	DISCERN instrument VPI	Quality of YouTube videos is fair, and the videos can be used as a useful source of stroke information for patients and families.

Note: HHS; hip hop stroke, SAQ: stroke awareness questionnaire, S-TOFHLA: short form of the test of functional health literacy in adults, SPER: stroke patient education retention, SHEAL: short-form health literacy scale, PSKQ: public stroke knowledge quiz, AIS: acute ischemic stroke, ICH: intracerebral hemorrhage, AF: atrial fibrillation, SCI: spinal cord injury, TBI: traumatic brain injury, Health LiTT: health literacy assessment using talking touchscreen technology, WRAT-4: wide range achievement test, 4th edition, DOACs: direct acting oral anticoagulants, AKT: anticoagulation knowledge tool, MMAS: Morisky medication adherence scale, HLS-EU-Q: health literacy survey European questionnaire, MMSE: mini–mental state examination, SA: Saudi Arabia, VPI: video power index, HL-3S: health literacy battery for three phases of stroke.

Stroke literacy assessment tools

A search result revealed ten studies regarding assessment tools, consisted of assessment tools for healthy populations (four articles), populations at risk (one article), and patients with stroke (one article). The assessment tools for healthy populations ask participants about stroke symptoms, stroke risk factors, stroke management, and sources of information.[7,11-13] Questions to assess stroke literacy are either open-ended,[11] or a combination of both open-ended and closed-ended.[12-13] Data collection methods in these four studies included internet-based surveys,[7,13] and face-to-face interviews.[11-12] Only one article assessed stroke knowledge in the population at high risk for stroke (patients with atrial fibrillation).[17] In this study, the authors used the anticoagulation knowledge tool (AKT) and the short form of the test of functional health literacy in adults (S-TOFHLA) to evaluate the level of anticoagulant knowledge and HL, respectively. AKT was developed to assess knowledge about anticoagulants.[28] AKT comprises 25 items for direct acting oral anticoagulant users and 35 items for warfarin users. The original version has 28 items. The authors did not describe validity and reliability of modified AKT. S-TOFHLA is a tool with good reliability and validity for assessing functional HL. The test items consist of 4 numeracy items and 2 prose passages. With a maximum score of 36, a score of 23 and above is considered to indicate adequate HL, while a score of 22 or less is considered to indicate inadequate HL.[29] One article assessed stroke literacy in patients with stroke.[20] The studied instrument comprises 25 questions on common sense, warning signs, risk factors and dos-and-do nots after treatment. Testing the instrument with 25 patients with stroke, the authors reported high reliability of the entire scale (Cronbach's alpha of 0.95) and the four domains (Cronbach's alphas of 0.81, 0.89, 0.91 and 0.90). Factor analysis confirmed an item structure with 63% cumulative variance.

Stroke health literacy level

Of seven articles reporting levels of SHL, four, one and two studied the general population, the population at high risk for stroke, and patients with stroke, respectively. Overall, ordinary people, people at risk of stroke, and patients with stroke had inadequate SHL. For example, in Japan, less than half of respondents were confident about their stroke knowledge.[7] Only 2.3% believed they could identify stroke symptom when it occurred. In Brazil, approximately one-third of respondents did not understand the meaning of stroke (abbreviated in Portuguese as AVC for “acidente vascular cerebral”), and 50% did not know the warning signs.[12] These findings were similar to those of study surveys in Saudi Arabia[13] and Singapore.[11] Specific areas in which inadequate stroke knowledge was found included the following: facial asymmetry as a stroke symptom, diabetes and dyslipidemia as stroke risk factors, use of recombinant tissue plasminogen activator (rt-PA) and early rehabilitation as effective stroke treatment, and the nearest health care center for stroke management.

A study in a population at high risk for stroke reported lower AKT scores in patients with good medication adherence than in their counterparts with poor medication adherence.[17] HL was correlated with anticoagulant knowledge but not associated with medication adherence. According to the small sample size in this study (48 patients), the effect size was too small to be generalized. For patients with stroke, two studies reported inadequate HL in stroke patients. Approximately half of discharged patients with stroke did not know about stroke symptoms, and more

than half were unaware of risk factors (such as hypertension and smoking).[20] Another study reported that patients with stroke had the lowest HL score compared to patients with spinal cord injury and patients with traumatic brain injury (mean T-score of 53.6 vs. 58.1 and 57.8, respectively).[19]

Interventions to improve stroke health literacy and effectiveness

In-hospital stroke educational programs for patients with stroke

Two articles reported stroke educational outcomes.[23-24] Sander et al.[23] measured educational outcomes after patients had participated in stroke education covering the following topics: personal risk factors for stroke, stroke warning signs, activation of emergency medical services, need for follow-up after discharge, and medications prescribed for stroke prevention.[2] The session lasted 30 to 60 minutes. The participants answered five open-ended questions and completed the S-TOFHLA. The mean score for stroke knowledge was 6.7 out of 10. Patients with inadequate HL had the lowest stroke knowledge compared to those with marginal and adequate HL. In other words, the stroke educational program in this study was ineffective in patients with inadequate HL.

In another study, a five-minute stroke education video was shown to patients with acute ischemic stroke and intracerebral hemorrhage.[24] Input from stroke survivors, caregivers, and a multidisciplinary team was received during the creation of the video content. The authors used a video script with a 6th grade reading level. The patients completed ten-item questionnaires written at a 4th grade reading level before, immediately after, and 30 days after watching the video. The findings showed an increase in the median knowledge score before and after watching the video (median of 6 vs. 7 for both immediately after and 30 days after). A significant proportion of patients recognized stroke symptoms immediately after the video, and knowledge was retained 30 days later. Almost three-quarters of patients were satisfied with the video.

Stroke educational programs for general populations

One article reported stroke educational programs for the general population, and another assessed the quality of stroke education videos from YouTube. William et al.[22] developed a school-based stroke educational program called "Hip Hop Stroke" (HHS) for children aged 9 to 12 years to communicate stroke knowledge with their parents. The children attended one-hour sessions to learn hip hop for three days. They watched two four-minute cartoon music videos and read a comic book with their parents at home. The media was professionally produced and included age-appropriate stroke knowledge. Children also placed an HHS magnet on their refrigerators. Parents completed a stroke knowledge questionnaire before and one week after the intervention. The findings showed that parents' stroke knowledge (stroke symptoms, urgent action plan, and FAST mnemonic) increased significantly after the intervention.

One article assessed the quality of YouTube videos providing stroke education. The authors analyzed 101 videos containing at least one of the following search terms: stroke, brain attack, hemorrhagic stroke, ischemic stroke, and transient ischemic attack. An analysis with the validated DISCERN instrument found that the quality of the videos was fair. Two-thirds of the videos were of professional quality (uploaded by hospitals, narrated by doctors, and included stroke symptoms). Only 14.85% of these videos mentioned risk factors for treatment.[25]

Discussion

This narrative review explored up-to-date knowledge about SHL assessment tools and levels of SHL in the general population, the population at risk of stroke, and patients with stroke. Only 14 articles regarding this area were found, while there were six systematic review articles on HL and type-2 diabetes.[30] There was only one SHL assessment tool developed specifically for patients with stroke, while the rest were adapted from standard HL assessment tools or were for stroke knowledge assessment. SHL was inadequate in the general population, the population at risk for stroke, and patients with stroke. Stroke education programs were effective for both the general population and patients with stroke.

The quality of the assessment tool affects the completeness and accuracy of the measurement outcome. In this review, only four articles reported assessment tools for HL in patients with stroke. One was developed specifically for patients with stroke, and the rest were adapted from general HL assessment tools. These tools were valid and reliable; however, implementation of this tools was not found in other study. Stroke literacy is different from HL for stroke. The first refers to knowledge about stroke, such as stroke symptoms and stroke warning signs,[7,11,13] while the latter refers to people's abilities to obtain, understand, and use health information to make informed decisions about their health and health care.[31] Unlike assessment tools for HL in patients with stroke, various assessment tools for stroke literacy were found, but validity and reliability were reported in only few articles. Developing assessment tools for HL is challenging particularly for topics relating to stroke.[32] It requires a theoretical understanding of HL and a clinical context of stroke. The conditions of patients with stroke vary which may explain the paucity of research on HL for stroke.[21] A shortage of SHL measurement tools was one key finding. This review found three studies that modified tools originally designed for the general population and then used them in stroke populations.[10,18,26] Even though all tools were shown to have some good psychometric roperties, retesting of validity and reliability is still required when they are implemented in different contexts, particularly when the targeted population differs from the study population. In this review, only one study developed a novel, specific measurement tool for the stroke population.[21] For this reason, HL measurement tools with good psychometric properties and specifically designed for stroke populations need to be further developed.

All articles in this review reported inadequate SHL in the general population, the population at high risk for stroke, and patients with stroke. Inadequate HL is associated

with poor understanding of medical information, adverse health outcomes, and undesirable health effects.[31] It is a concern that the general population with inadequate SHL has a higher risk of stroke and that stroke patients with inadequate SHL have poorer treatment outcomes than their counterparts with adequate SHL. For example, a lack of knowledge about warning symptoms of stroke and health service providers for stroke in an area can result in delayed treatment and poor treatment outcomes. Unfortunately, none of the articles in this review reported an association between SHL and health outcomes. Thus, future research to examine this association are needed. Factors associated with inadequate SHL vary depending on diseases and conditions. For example, cognitive impairment decreases stroke patients' ability to comprehend health information, and physical disability in stroke patients limits their accessibility to health care services. From the review, limited knowledge regarding factors associated with SHL was found, and further study in this area is required.

Improving HL is crucial to prevent stroke, both in the general population and patients with stroke, and promote recovery from stroke attack. Similar to this review, Visscher et al.[33] found that most interventions to improve HL were focused on the functional level - the lowest level of HL. People with a functional level of HL can obtain information from health resources but cannot use information to communicate with other people, including health professionals.[3] The primary objective of HL interventions is to empower patients to move from passive to active and become critical players in health care. Articles in this review failed to demonstrate such improvement in participants. A comprehensive HL intervention model provides a comprehensive approach to developing HL interventions based on a complex HL concept.[34] This model targets individuals, individuals with inadequate HL, communications between individuals and health professionals, health professionals, and health service barriers.

This review has some limitations. Firstly, the inclusion of only studies published in English may have limited the results from relevant studies written in other languages. Secondly, restricted searching term to "health literacy" and "stroke literacy" but not include other similar term such as "stroke knowledge" or " stroke awareness", may limited other relevant studies. Thirdly, the inclusion of all relevant studies regardless of their quality biased the interpretation of findings. However, this was considered necessary, as there are still limited studies in this area. Finally, the article search in this review was not exhaustive, and relevant articles not published in PubMed and Scopus were not included in this review.

Future directions

Stroke educational campaigns have been proved to be an effective method to improve knowledge and awareness regarding stroke.[35] Therefore, stroke educational campaigns can be implemented as one intervention strategy to improve HL in patients with stroke. In term of assessment, we found a lack of clinical implications of assessment tools for HL in patients with stroke. HL is linked to medical adherence and health outcomes. Therefore, HL assessment with valid and reliable tools should be performed in clinical practice to assess HL in patients with stroke before and after educating patients. Moreover, strong research designs are needed to develop assessment tools and evaluate the effectiveness of HL interventions.[32]

Conclusion

This review presents updated knowledge on SHL. This knowledge is very limited; however, the review showed 1) various validated and reliable tools to assess SHL; 2) inadequate SHL in the general population, the population at high risk for stroke, and patients with stroke; and 3) interventions to improve SHL. Further research on SHL is needed in order to expand knowledge and comprehension regarding stroke health literacy, and thus improve preventive, curative, and rehabilitative outcomes.

Ethical approval

Ethical approval and patient consent were not required since the present study was a narrative review of previously published literature.

Declaration of conflicting interests

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