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Concept Analysis of Post-Stroke Cognitive Function in Ischemic Stroke Patients: Implications for Nursing Practice

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ABSTRACT

Ischemic stroke is a major cause of neurological disability, often resulting in cognitive impairment that impacts quality of life, functional status, and caregiver burden. However, there has been no systematic conceptual analysis explaining the attributes, antecedents, and consequences of cognitive function in ischemic stroke patients. Thi study aims to comprehensively analyze the concept of cognitive function in ischemic stroke patients, clarifying its definition, attributes, antecedents, consequences, and empirical references. This concept analysis followed the seven-steps approach by Walker and Avant. Literature search was conducted through PubMed, Scopus, and CINAHL with the following inclusion criteria: publications from 2020 to 2025, in English, focusing on post-stroke cognitive function. A total of 22 articles from various disciplines were analyzed. Empirical references were selected based on their relevance to cognitive attributes. Data were extracted and synthesized according to the attributes, antecedents, and consequences to form a conceptual definition. The six main attributes of cognitive function in ischemic stroke are: memory, executive function, attention, language, orientation, and visuospatial function. Antecedents include biological-structural factors (infarct location/size), sociodemographic factors (age, education), clinical factors (comorbidities, stroke severity), functional factors, and psychological factors. The consequences include a decline in quality of life, functional status, increased caregiver burden, and mortality. Instruments such as MoCA, MMSE, and biological biomarkers were identified as key empirical references. This conceptual analysis provides a strong theoretical foundation for nursing practice, emphasizing the importance of early detection and attribute-based multidisciplinary interventions to prevent further cognitive decline. This study has limitations, as variations in the assessment phase may affect the heterogeneity of cognitive impairment. Further research is recommended to validate this concept with clinical data, test the effectiveness of specifically designed interventions, and conduct longitudinal studies to monitor long-term cognitive function.

Keywords : Concept analysis; cognitive attributes; cognitive function; ischemic stroke; post-stroke recovery

INTRODUCTION

Stroke is the second leading cause of death in the world, with ischemic stroke being the most common type, accounting for more than 60% of cases. The number of new cases, 7.86 million in 2020, is projected to increase to 9.62 million by 2030 (1). In Indonesia, based on data from the Ministry of Health, stroke prevalence reached 8.3 per 1,000 population aged >15 years, with ischemic stroke remaining the most dominant type (2). These figures not only show the magnitude of the global and national burden of stroke, but also underscore the need for attention to its long-term consequences, particularly the cognitive impairment experienced by most survivors.

Cognitive functions are the result of interactions between various levels of brain organization, from the molecular and cellular levels to networks that integrate complex relationships between several systems and neural circuits(3). Cognitive attributes include perception, attention, memory, concentration, orientation, learning, reasoning, evaluation, decision-making, problem-solving, and communication, including language use. Clinically, cognitive function can be operationalized and assessed objectively using standardized instruments such as the Montreal Cognitive Assessment and the Mini-Mental State Examination (MMSE), which measure performance in these various attributes(4, 5). Establishing an initial operational definition of cognitive function is essential before further conceptual clarification is undertaken.

Systematic review results reported that the global prevalence of cognitive impairment ranged from 5.1% to 41%. The incidence of cognitive impairment ranged from 22 to 76.8 per 1000 people/year, with a median of 53.97 per 1000 people/year(6). A study reported that of 24,055 first-time ischemic stroke patients, 78.7% experienced cognitive impairment(7). Data from the American Heart Association, also shows that approximately 60% of stroke patients experience cognitive impairment, indicating that this problem is clinically significant(8). The high incidence rate shows that cognitive impairment is one of the main effects of stroke that requires serious attention in treatment and rehabilitation.

Various important concepts in post-stroke recovery, such as resilience(7), aphasia recovery(8), and exercise preference in post-stroke patients(9), have been conceptually analyzed to support nursing and rehabilitation practices. However, there has been no conceptual analysis specifically focused on cognitive function in ischemic stroke patients. Most existing studies only describe prevalence, related risk factors, or neuropsychological outcomes, but have not provided a structured clarification of the attributes, antecedents, and consequences of cognitive function. Without conceptual clarity, the development of interventions, selection of appropriate

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assessment instruments, and interpretation of research results may be suboptimal. Therefore, this study aims to analyze the concept of cognitive function in ischemic stroke patients, identify its main attributes, describe antecedents and consequences, and provide a theoretical basis for nursing interventions and rehabilitation strategies.

MATERIAL AND METHODS

Concept Analysis Approach

This study's method uses concept analysis. A concept represents a symbol of a larger spectrum that forms the basis of the researcher's goal. The concept analysis method is based on an evolutionary perspective, which examines contemporary concerns that assess dynamism and interrelationships within reality. Concept analysis consists of seven phases: identifying and naming concepts, identifying relevant terms and uses of concepts, selecting appropriate fields for data collection, recognizing concept attributes, confirming empirical references, antecedents, and consequences of concepts where possible, identifying related concepts, and producing case models[10]. In this study, articles that met the inclusion criteria were read thoroughly, and data containing definitions of cognitive function, key characteristics, antecedents, and impacts were recorded in a summary table. Attributes were determined from characteristics that consistently appeared in various articles. Antecedents and consequences were identified from reported causal factors and clinical outcomes. Furthermore, case models, borderline cases, and contrary cases were developed by adapting clinical illustrations from literature findings to clarify the attributes of the concept.

Data Source

Literature search using the Pubmed, Scopus, and CINAHL databases with the keywords (((“cognition”) OR (“cognitive function”)) OR (“cognitive functioning”)) AND (“ischemic stroke”) supplemented with searches using psychology and communication dictionaries. References were selected based on scientific literature in psychology, medicine, nursing, clinical nutrition, neurological rehabilitation, and communication that explained or defined cognitive function. Inclusion criteria: articles discussing cognitive function in ischemic stroke patients, published between 2020 and June 30, 2025, available in full text, written in English. The time frame (2020–2025) was chosen to ensure that the concept analysis reflects modern definitions, measurement tools, and nursing implications of cognitive function, while minimizing outdated or inconsistent terms from earlier decades. Exclusion criteria: cognitive function was not the main focus, or the discussion was limited, review, in vitro study design, full text of the article was not available. The article selection process was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. From the selection results, 22 articles were used for concept analysis of cognitive function. The PRISMA 2020 framework was used to ensure transparency and reproducibility in the literature selection process. However, PRISMA was used only as a guideline for the search and screening steps, not as a complete systematic review protocol. The purpose of this study was to perform a concept analysis using Walker and Avant's method. The article search and selection process is presented in Figure 1 in accordance with the PRISMA flow chart guidelines.

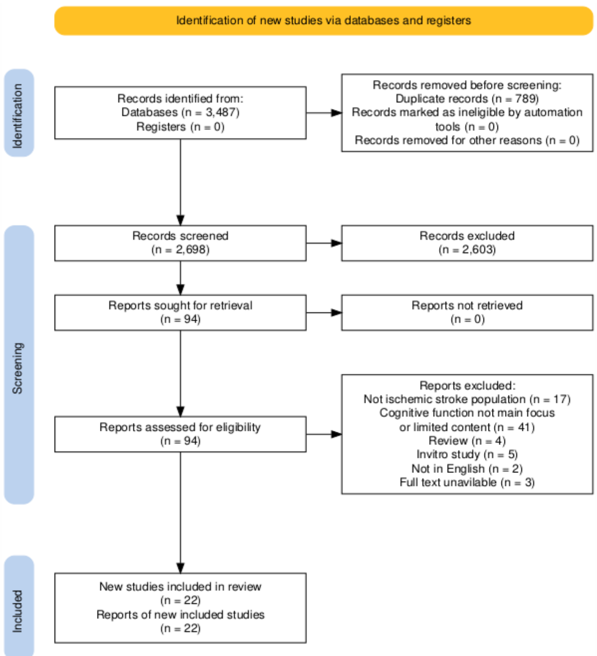

Figure 1. PRISMA flow chart

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RESULT

Identifying the Uses of the Concept

The concept of cognitive function in ischemic stroke was identified by examining literature that applied cognitive function to various disciplines from several databases. The literature search was not limited to one discipline, as this could lead to bias in understanding the concept(10). Based on the literature, a definition of cognitive function in ischemic stroke is obtained from various disciplines, including nursing, medicine, psychology, clinical nutrition, and neurological rehabilitation. The definition of the cognitive function of ischemic stroke patients can be seen in table 1.

Table 1. Definitions of cognitive function from various disciplines

No	Authors	Disciplines	Definition
1.	(11)	Medicine	Neuropsychological performance as measured through examinations of verbal and visual memory and executive function, reflecting episodic memory and executive function
2.	(12)	Nursing	Mental abilities were assessed using the Mini-Mental State Examination (MMSE), consisting of six cognitive attributes: orientation, immediate memory, attention and calculation, recall, language (including repetition, three-step instructions, reading, writing), and visuospatial abilities (copying pictures).
3.	(13)	Clinical nutrition	Individual mental abilities including visual-spatial, language, memory, attention, and orientation with interpretation categories from normal to severely impaired using the MMSE.
4.	(14)	Nursing	Mental abilities were measured using the MoCA-Changsha Version (MoCA-CS), which reflects overall cognitive status.
5.	(15)	Medicine	Cognitive abilities were measured using the Mini-Mental State Examination (MMSE), which includes aspects of orientation, registration, attention and calculation, language, recall, and visual construction.
6.	(16)	Neurorehabilitation	Global brain abilities that include aspects of language, memory, attention, abstraction, orientation, and executive function, as measured by the Montreal Cognitive Assessment test.
7.	(4)	Medicine	Mental abilities were measured using the MMSE and MoCA, covering the attributes of attention, concentration, orientation, language, ability to follow verbal and written commands, and short-term and immediate memory.
8.	(17)	Medicine	Ability in communication and social cognition, which includes comprehension, expression, social interaction, problem solving, and memory, as measured through the FIM cognitive subscore. Scores range from 5 to 35 points, with higher scores indicating better levels of cognitive independence
9.	(18)	Medicine	Cognitive function is operationally defined through the Montreal Cognitive Assessment (19) and several additional neuropsychological tests that specifically evaluate various cognitive attributes such as short and long term memory, attention, executive function, and language function.
10.	(20)	Psychology	Individuals' performance in various cognitive attributes, including verbal and visuospatial memory, as well as attention, executive function, processing speed, cognitive flexibility, and response inhibition, were assessed through combined scores from several standardized neuropsychological tests such as the RAVLT, Rey Complex Figure Test, TMT A/B, Digit Symbol Coding, and Color-Word Interference Test (CWIT).
11.	(21)	Psychology	Levels of higher cerebral functions including language, orientation, attention, visuospatial functions, memory,

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No	Authors	Disciplines	Definition
			emotion, and self-awareness, which were assessed using the Barrow Neurological Institute Screen (BNIS).
12.	(22)	Medicine	Individual performance in five key attributes covering executive function, memory, language, attention, and visuospatial function.
13.	(23)	Medicine	Mental abilities including orientation, registration, attention and calculation, recall, and language, assessed using the MMSE, with total scores ranging from 0 to 30, with higher scores indicating better cognitive function.
14.	(24)	Medicine	Mental performance on executive function, language, visuospatial, and memory assessed using K-MMSE
15.	(25)	Medicine	A person's abilities in various mental attributes, including visuospatial/executive functions, naming, attention, language, abstraction, memory, and orientation.
16.	(26)	Medicine	A person's performance in seven cognitive attributes: episodic memory, processing speed, visuoconstruction, executive function, visual neglect, language impairment, and attention and working memory.
17.	(27)	Psychology	The mental abilities of post-stroke patients were evaluated in the acute phase using the Montreal Cognitive Assessment (19), and reassessed through subjective cognitive complaints three months after stroke. These complaints included the ability to speak, understand speech, read, write, calculate, remember and concentrate.
18.	(28)	Medicine	Global cognitive performance, memory, and executive function measured through a series of neuropsychological tests.
19.	(29)	Medicine	Global cognitive abilities include 9 main attributes: attention, concentration, executive function, memory, language, visuospatial ability, conceptual thinking, calculation, and orientation. Executive functions are also evaluated to assess abilities such as mental flexibility, letter and number recognition, visual scanning, processing speed, and motor function.
20.	(30)	Medicine	Mental abilities that cover 9 main attributes: visuospatial/executive, naming, attention, calculation, sentence repetition, verbal fluency, abstraction, delayed memory, and orientation.
21.	(31)	Medicine	The ability of individuals post-ischemic stroke to perform across various cognitive attributes, including memory and learning, attention and recognition, executive function, expressive language, information processing speed, cognitive inhibition and mental flexibility, as well as orientation, visuospatial abilities, and abstract thinking
22.	(32)	Nursing	The ability of post-ischemic stroke patients to perform across various cognitive attributes, including visuospatial and executive function, naming, memory, attention and concentration, language, abstraction, delayed recall, and orientation.

The definition of cognitive function in ischemic stroke patients varies across disciplines, despite the use of different instruments such as MoCA, MMSE, FIM, and other psychometric tools. However, there are six main attributes that consistently appear, namely memory, executive function, attention, language, orientation, and visuospatial function.

Definition of Attributes

Attributes are determined based on the results of frequent word identification[10]. Based on previous literature search (table 1) and identification of keywords based on attributes (table 2), there are six attributes of

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cognitive function, namely: 1) memory; 2) executive function; 3) attention; 4) language; 5) orientation; and 6) visuospatial function. Based on these six attributes, the operational definition of cognitive function in ischemic stroke is the ability of individuals who have been diagnosed with ischemic stroke based on medical diagnosis and neuroimaging in maintaining and using six main cognitive attributes, namely memory, executive function, attention, language, orientation, and visuospatial function, which can be measured using specific psychometric instruments such as MoCA and MMSE.

Table 2. Keyword Clusters of Cognitive Function Attributes

Keyword Clusters	Sources	Attributes
Verbal memory Visual memory Short and long term memory Working memory Episodic memory Auditory memory Visuospatial memory Recall (Immediate and delayed) Recognition Registration Remembering things Memory performance Learning Memory difficulties	(4, 11, 15-18, 20, 23, 25-27, 31, 32)	Memory
Executive function Problem-solving Reasoning Abstraction Conceptual thinking Abstract thinking Intelligent recreations Mental flexibility Cognitive flexibility Cognitive inhibition Response inhibition Information organization Processing speed Computation Counting Visual scanning letter and number recognition Ability to follow simple verbal and written commands	(4, 14-17, 20, 25-29, 31, 32)	Executive function
Attention Concentration Concentration difficulties Processing speed Computation	(4, 13, 15, 16, 20, 25, 27, 32)	Attention
Language Expression comprehension Naming Verbal fluency Language repetition Expressive language Speaking Understanding speech Reading Writing Three-step instruction Communication	(12-18, 25-27, 31-33)	Language

Keyword Clusters	Sources	Attributes
Language deficits Processing speed		
Orientation	(4, 13, 15, 16, 25, 27, 31, 32)	Orientation
Visuospatial abilities Visual-spatial skills Visuoconstruction/visual construction Visual neglect	(13, 15, 25-27, 31, 32)	Visuospatial function

Table 2 groups keywords from cognitive function attributes identified from various literature. This grouping facilitates the identification of key attributes that frequently appear in research and clinical practice. This grouping helps to unify different terminology from various disciplines so that it is easier to understand and apply in research and clinical practice. Based on the grouping results in table 2, further details regarding the definition of each cognitive function attribute in ischemic stroke patients are presented in table 3.

Tabel 3. Attributes of Definitions

Attributes	Definitions
Memory	The ability to store, retain, and retrieve information in various forms, including verbal and visual memory, both short-term and long-term, encompassing episodic memory, working memory, immediate and delayed recall, as well as learning capacity. This ability can be affected by neurological conditions such as hippocampal atrophy in patients with ischemic stroke [4, 11, 18, 20].
Executive function	The mental ability to regulate, plan, and direct responses in a flexible and goal-oriented manner, including problem-solving, reasoning, abstraction, and following verbal or written instructions [4, 17, 20, 29, 31, 32].
Attention	The ability to focus and process information efficiently, including selective attention, concentration, and basic computation [15, 20, 27].
Language	The cognitive ability to understand and use language both verbally and in writing, including comprehension, expression, naming, verbal fluency, writing, reading, and communication [12, 17, 27, 32].
Orientation	The cognitive ability assessed using standard psychometric instruments such as the MMSE and MoCA, which measure orientation to time, place, and person [4, 12].

Table 3 presents the operational definitions of each attribute, which can be used as a basis for selecting measurement instruments and designing cognitive rehabilitation interventions. Overall, these findings confirm that post-stroke cognitive function is multidimensional and requires specific evaluation and intervention for each attribute.

Developing Case

Model Case

Mr. A, 65 years old, had an ischemic stroke of the right parietal lobe. The patient had a history of hypertension and diabetes mellitus. After stabilizing his condition, a cognitive examination using MoCA was conducted with a score of 19/30. The patient had difficulty remembering simple commands, could not focus, and could not complete tasks with logical and planned thinking. The patient was unable to draw three-dimensionally during the examination. The patient also had difficulty interpreting the position of objects, difficulty in composing complex sentences, and difficulty recognizing time and place. The patient also had difficulty composing complex sentences and following simple commands, possibly as a result of attention and working memory impairment.

Borderline Case

Mr. B, 58 years old, had a frontal ischemic stroke. After recovery, the patient could perform daily activities independently, but the family complained that the patient easily forgot new information and had difficulty following long conversations. Language and orientation functions were still good.

Contrary Case

Mrs. C, aged 50 years, had an ischemic stroke in the cerebellum area. After being treated, the patient was able to carry out activities as usual without cognitive complaints. The patient was able to recount the experience from the stroke attack until receiving treatment at the hospital. The patient was able to focus on doing administrative work in the office and did not show any orientation and language disorders.

Antecedents dan Consequences

Antecedents are things that happened before that can be identified as connecting with others, imagining opportunities, recognizing strengths, and finding meaning. Consequences are things that are expected, and the possibility of high, medium, and low consequences and the value of desirable or undesirable changes[34]. The antecedents and consequences concept of cognitive function can be seen in Figure 2.

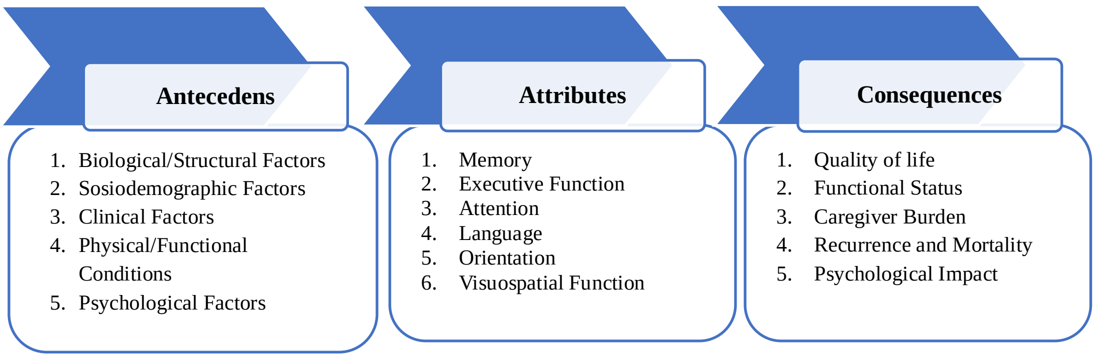

Figure 2. Antecedents and Consequences of the Concept of Cognitive Function

Antecedents and consequences of cognitive function in ischemic stroke patients in this study are not only based on the articles analyzed for attributes, but also reinforced with relevant supporting literature, to obtain a more comprehensive understanding of the concept. Antecedents of cognitive function in ischemic stroke patients include various factors. Biologically, cognitive function is influenced by brain tissue topology, as well as infarct location and size. Sociodemographic aspects such as age, gender, and education level are contributing factors. Clinically, a history of previous stroke as well as the presence of comorbidities such as diabetes mellitus, hypertension, hyperlipidemia, and atrial fibrillation play a role in the increased risk of cognitive impairment. Functional status is also an important antecedent, including level of independence and stroke severity, impacting cognitive function. In addition, psychological factors such as depression exacerbate cognitive impairment in post-stroke patients[23, 35-37].

The consequences of cognitive function in ischemic stroke patients are quality of life and functional status. Patients who experience cognitive impairment lead to a decrease in functional status characterized by increased dependence in activities of daily living (ADL). Post-stroke cognitive impairment also causes psychological impacts such as depression. In addition, it increases the risk of stroke recurrence and mortality[37, 38].

Empirical Referents

Empirical referents in the concept of post-stroke cognitive function include objective measurement tools that can identify the presence and degree of impairment in each cognitive attribute. One widely used measurement tool is the Mini Mental State Examination (MMSE) which assesses six cognitive attributes, namely orientation, immediate memory, attention and calculation, recall, language (language repetition, three-step instructions, reading comprehension, writing), and copying images (visuospatial function)[12, 13, 15, 20, 23], including the MMSE-K which is the Korean version[24].

In addition, the Montreal Cognitive Assessment is widely used to detect mild cognitive impairment and evaluates attributes similar to the MMSE but more sensitive[16, 18, 22, 27], including the Changsha version (MoCA-CS) to assess cognitive function[14], the Beijing version[25] , and the Thai version[32]. Some studies have also used a combination of MMSE and MoCA [4], MoCA and The Trail Making Test (TMT) Parts A and B to assess executive function [29], MoCA and CVLT, Stroop Test, Verbal Fluency Test [31], Thai mental state examination (TMSE) and Montreal Cognitive Assessment[30].

Several other instruments were used, such as the Cognitive Reserve Index to assess cognitive reserve, Functional Independence Measure (FIM), communication and social cognition subscales, the Barrow Neurological Institute Screen (BNIS), Star Cancellation Test, Stroke Impact Scale (SIS) as well as biological biomarkers such as interleukin, GM-CSF, IFN-γ, MIP-3α, TNF-α, and TNF-β[17, 21]. Other comprehensive neuropsychological tests include the Trail Making Test, WAIS-III Digit Symbol Coding, COWAT, Boston Naming Test, CVLT-II, Rey-Osterrieth Complex Figure, ideational subtests of the BDAE-3, as well as CLOX1 for visuospatial skills. These tests provide a comprehensive overview of the memory, executive function, language, and visual abilities of post-stroke patients[11]. These tests are used to evaluate the memory, executive function, language, as well as visual ability of post-stroke patients.

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DISCUSSION

This concept analysis aims to clarify the understanding of cognitive function through the delineation of its antecedents, attributes and consequences. The case studies show variations in the degree of cognitive impairment, ranging from no impairment to mild and severe impairment, indicating that the decline in cognitive function is multifactorial. Factors such as age, disease history, infarct location and extent, as well as neurodegenerative processes such as neuronal disconnection, plaque accumulation, cellular biochemical and molecular changes, contribute to these impairments(39).

Biologically, lesions in the frontal and parietal lobes are closely related to impaired in memory, information processing, and executive function. On the other hand, advanced age, gender, and low education level have been identified as risk factors for post-stroke cognitive impairment(37). Comorbid diseases such as hypertension and diabetes mellitus aggravate the condition through endothelial dysfunction, chronic cerebral hypoperfusion, and brain white matter damage. Psychological disorders such as post-stroke anxiety and depression also worsen attention and motivation, which have a direct impact on cognitive function(40, 41).

The six main attributes of cognitive function in this study are memory, executive function, attention, language, orientation, and visuospatial function. Memory is one of the main attributes that is most often impaired(42). These findings are consistent with research results in stroke patients who reported that memory impairment was also found to be one of the most frequently affected cognitive attributes along with executive function, even though the decline was not influenced by the type of stroke(43). The size and location of the infarct determine the severity of cognitive impairment, especially in left-hemisphere strokes involving the hippocampus, the brain's memory center(44). Additionally, the loss of neurons in the prefrontal cortex, which plays a role in memory, can cause long-term cognitive impairment(45). Therefore, early memory assessment is very important for early treatment and prevention of long-term complications.

Executive function reflects the ability to think logically, flexibly, and purposefully. These executive functions can be improved through structured physical exercise such as High-Intensity Interval Training(29). Attention is also an important attribute that is often impaired after a stroke. Attention disorders can manifest in various forms, such as difficulty concentrating, slowed thinking, and decreased numeracy. Cognitive rehabilitation that includes direct attention training, computer-based cognitive interventions, medication, and environmental control can help improve attention(46). Post-stroke cognitive impairment, both in executive function and attention, is highly dependent on the location of the lesion. The prefrontal cortex plays an important role in memory, learning, executive function, planning, cognitive flexibility, and attention. Damage to this area can cause long-term cognitive impairment(45). Based on this, early identification is necessary so that physical exercise and cognitive rehabilitation can be implemented immediately to improve function.

Language is an important attribute in cognitive functions involving the ability to understand and express information verbally and in writing. Post-stroke patients may experience aphasia, dysarthria, and apraxia. Aphasia commonly occurs in left hemisphere strokes due to damage to Wernicke's area, Broca's area, and the arcuate fasciculus. During the acute phase of stroke, apraxia may occur concurrently with dysarthria or aphasia(47). The language disorders experienced require a specialized approach to care, so language assessment should be included in initial screening to support patient and family education.

Orientation, although often referred to only in general terms, remains an important attribute because orientation disorders can be an early indicator of global cognitive impairment. Instruments such as MoCA and MMSE group orientation into the dimensions of time, place, and person. Therefore, in this analysis, orientation is used as a representative keyword.

The visuospatial function enables a person to construct three-dimensional mental representations, two-dimensional images, and manipulate them mentally. This function is usually intact in small vessel ischemic stroke, but may be impaired in multi-infarct dementia(48, 49). This indicates that there is overlap between cognitive attributes, so nurses need to use assessment instruments that cover more than one attribute. Of all cognitive attributes, memory and executive function are the attributes most consistently reported to be impaired in ischemic stroke patients, while orientation is rarely discussed in detail. Variations between studies are influenced by differences in assessment instruments, stroke phase, and population background. This synthesis highlights the need for a more standardized cognitive assessment protocol to ensure greater consistency in research findings and clinical practice.

Cognitive function assessment is generally performed using standard psychometric instruments such as the MMSE and MoCA. In addition to psychometric instruments, recent developments in cognitive assessment include the use of biological biomarkers to detect nerve damage and inflammation. Neurofilament light chain (NfL), interleukin (IL-6), GM-CSF, IFN-γ, TNF-α, and TNF-β have been reported to be elevated in stroke patients with cognitive impairment and correlate with severity(17). One serum biomarker that decreases in stroke patients is BDNF, which correlates with cognitive function and shows potential as an effective biomarker for assessing the risk of post-stroke cognitive impairment(50). Assessment using biomarkers can provide a more objective and predictive assessment of the risk of cognitive decline. However, its use is still limited to research and has not been

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integrated into everyday clinical practice. Therefore, psychometric instruments remain the primary tool that nurses must master for early detection.

Cognitive impairment is one of the main consequences of stroke that significantly affects patients' quality of life and independence. Progressive cognitive rehabilitation not only aids in the recovery of brain function, but also improves the psychological well-being and emotional adaptation of stroke patients. Therefore, a multidimensional approach that includes clinical, psychometric, and biological assessments is key to detecting, managing, and preventing the worsening of post-stroke cognitive impairment[40, 41].

These findings reinforce the importance of routine cognitive screening in nursing services, both in hospitals and in the community. Practical recommendations include: initial cognitive assessment using MoCA/MMSE when patients are admitted to hospital, follow-up 1–3 months after discharge, education of caregivers to support cognitive exercises at home, and integration of simple cognitive exercises into rehabilitation programs. This study has several limitations. All studies used focused on ischemic stroke patients, but research limitations include variations in the assessment phase (acute, subacute, chronic), which may affect the reported cognitive impairment profile. The use of the PRISMA guidelines was only as a guide for searching and screening, not as a full systematic review protocol.

CONCLUSION AND SUGGESTION

This concept analysis shows that cognitive function in ischemic stroke patients is a multidimensional aspect that includes six main attributes: memory, executive function, attention, language, orientation, and visuospatial function. Impairment in these functions is influenced by various antecedents, such as age, comorbidities, location and extent of brain lesions, and psychological status. The consequences include reduced quality of life, dependency in daily activities, burden for caregivers, and increased risk of recurrence and mortality. Understanding this concept provides a strong theoretical basis for designing appropriate nursing interventions, adjusting measurement instruments, and accelerating cognitive recovery in ischemic stroke patients. Thus, a comprehensive rehabilitation approach and early detection of cognitive impairment are important in improving patient outcomes.

The results of this concept analysis indicate the importance of integrating cognitive function assessment in the nursing practice for ischemic stroke patients. Nurses need to recognize changes in cognitive function by conducting early detection using instruments such as MoCA and MMSE, and should consider biological biomarkers as additional objective indicators in cognitive assessment. Rehabilitation interventions should be specifically designed based on these attributes, involving a multidisciplinary approach and family support. Training for healthcare workers is needed to increase their capacity to recognize and manage cognitive impairment. In addition, further research is recommended to test the effectiveness of interventions based on cognitive attributes and explore the potential of biomarkers as objective references in cognitive function assessment.

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REFERENCES

1. Pu L, Wang L, Zhang R, Zhao T, Jiang Y, Han L. Projected global trends in ischemic stroke incidence, deaths and disability-adjusted life years from 2020 to 2030. Stroke. 2023;54(5):1330-9.
2. Ministry of Health. Indonesia health survey (SKI) 2023 in numbers. Jakarta: Ministry of Health 2023.
3. Birle C, Slavoaca D, Balea M, Livint Popa L, Muresanu I, Stefanescu E, et al. Cognitive function: holarchy or holacracy? Neurol Sci. 2021;42(1):89-99.
4. Zhang C, Zhang X, Meng P, Gao H, Bai B, Li D. The association between serum uric acid and cognitive performance in patients with ischemic stroke is modified by estimated glomerular filtration rate. Sci Rep. 2023;13(1):7097.
5. Bender A, Beller S. Cognition and Cognitive Science. In: Stanlaw J, editor. The International Encyclopedia of Linguistic Anthropology. Hoboken (NJ): Wiley-Blackwell; 2020.
6. Pais R, Ruano L, O PC, Barros H. Global cognitive impairment prevalence and incidence in community dwelling older adults-a systematic review. Geriatrics (Basel). 2020;5(4).
7. Yan HY, Lin HR. Resilience in Stroke Patients: A Concept Analysis. Healthcare (Basel). 2022;10(11).
8. Gleeson L, Jagoe C. Recovery in the context of post-stroke aphasia: A concept analysis. Advances in Communication and Swallowing. 2023tim;26(1):25-35.
9. Dai Y, Shi H, Ji K, Han Y, De Ala M, Wang Q. Exercise preference in stroke survivors: a concept analysis. Front Neurol. 2024;15:1326649.

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e-ISSN : 2549-0567 (Online)

10. Walker LO, Avant KC. Strategies for theory construction in nursing. 5th ed. Harlow (England): Pearson Education Limited; 2014.
11. Barber P, Nestor SM, Wang M, Wu P, Ursenbach J, Munir A, et al. Hippocampal atrophy and cognitive function in transient ischemic attack and minor stroke patients over three years. Cereb Circ Cogn Behav. 2021;2:100019.
12. Cao S, Teng L, Gao M, Hu S, Xiao S, Chen C, et al. Nonlinear relationship between triglycerides and cognitive function after acute ischemic stroke among older adults. Heliyon. 2024;10(6):e27943.
13. Karimi E, Khorvash F, Arab A, Sepidarkish M, Saadatnia M, Amani R. The effects of royal jelly supplementation on oxidative stress, inflammatory mediators, mental health, cognitive function, quality of life, and clinical outcomes of patients with ischemic stroke: study protocol for a randomized controlled trial. BMC Nutr. 2023;9(1):32.
14. Li F, Kong X, Zhu H, Xu H, Wu B, Cao Y, et al. The moderating effect of cognitive reserve on cognitive function in patients with Acute Ischemic Stroke. Front Aging Neurosci. 2022;14:1011510.
15. Li H, Yang D, Liu S, Zhu Z, Shi M, Xu T, et al. Effects of early antihypertensive treatment on cognitive function in patients with acute ischemic stroke with different neurofilament light chain levels. J Stroke Cerebrovasc Dis. 2025;34(2):108206.
16. She R, Yan Z, Hao Y, Zhang Z, Du Y, Liang Y, et al. Comorbidity in patients with first-ever ischemic stroke: Disease patterns and their associations with cognitive and physical function. Front Aging Neurosci. 2022;14:887032.
17. Zhang Y, Song H, Wang J, Xi X, Cefalo P, Wood LJ, et al. Multiplex array analysis of serum cytokines offers minimal predictive value for cognitive function in the subacute phase after stroke. Front Neurol. 2022;13:886018.
18. Gu Z, Sun X, Wu C, Li B, Chen J, Wang W, et al. Lower 25-hydroxyvitamin D is associated with severer white matter hyperintensity and cognitive function in patients with non-disabling ischemic cerebrovascular events. J Stroke Cerebrovasc Dis. 2023;32(10).
19. Postoiu RL, Mocanu EM, Schek S, Lapadat M, Chipăruș CE, Onose G. Clinical and rehabilitative considerations in a complex case of spastic tetraplegia, mixed aphasia, secondary encephalopathy – post severe traumatic brain injury with hemorrhagic and ischemic lesions – with favorable late evolution and post-symptomatic status after SARS-COV-2 infection. Balneo PRM Res J. 2022;13(1).
20. Kliem E, Gjestad E, Ryum T, Olsen A, Thommessen B, Indredavik B, et al. The Relationship of Psychiatric Symptoms with Performance-Based and Self-Reported Cognitive Function after Ischemic Stroke. J Int Neuropsychol Soc. 2022;28(1):35-47.
21. Samuelsson H, Viken J, Redfors P, Holmegaard L, Blomstrand C, Jern C, et al. Cognitive function is an important determinant of employment amongst young ischaemic stroke survivors with good physical recovery. Eur J Neurol. 2021;28(11):3692-701.
22. Georgakis MK, Fang R, Düring M, Wollenweber FA, Bode FJ, Stösser S, et al. Cerebral small vessel disease burden and cognitive and functional outcomes after stroke: A multicenter prospective cohort study. Alzheimer's Dementia. 2023;19(4):1152-63.
23. Hua J, Zhou Y, Chen L, Tang X, Diao S, Fang Q. How do cardiovascular risk factors correlate with post-stroke cognitive function: Directly or indirectly through stroke severity? Frontiers in Neurology. 2022;13.
24. Lee M, Oh MS, Jung S, Lee JH, Kim CH, Jang MU, et al. Differential effects of body mass index on domain-specific cognitive outcomes after stroke. Sci Rep. 2021;11(1).
25. Niu S, Liu X, Wu Q, Ma J, Wu S, Zeng L, et al. Sleep Quality and Cognitive Function after Stroke: The Mediating Roles of Depression and Anxiety Symptoms. Int J Environ Res Public Health. 2023;20(3).
26. Schellekens MMI, Li H, Boot EM, Verhoeven JI, Ekker MS, Meijer FJA, et al. White matter integrity and cognitive performance in the subacute phase after ischemic stroke in young adults. NeuroImage Clin. 2025;45.
27. Zanin A, Reinholdsson M, Abzhandadze T. Association of cognitive function very early after stroke with subjective cognitive complaints after 3 months, a register-based study. PloS one. 2023;18.
28. Springer MV, Chen B, Whitney RT, Briceño EM, Gross AL, Aparicio HJ, et al. Age differences in the change in cognition after stroke. J Stroke Cerebrovasc Dis. 2024;33(12):108087.
29. Gjellesvik TI, Becker F, Tjonna AE, Indredavik B, Lundgaard E, Solbakken H, et al. Effects of High-Intensity Interval Training After Stroke (The HIIT Stroke Study) on Physical and Cognitive Function: A Multicenter Randomized Controlled Trial. Arch Phys Med Rehabil. 2021;102(9):1683-91.
30. Dharmasaroja PA. Temporal change in cognitive function in early recovery phase of the stroke. J Stroke Cerebrovasc Dis. 2021;30(10):106027.
31. Kotlęga D, Peda B, Palma J, Zembroń-łacny A, Gołab-Janowska M, Masztalewicz M, et al. Free fatty acids are associated with the cognitive functions in stroke survivors. Int J Environ Res Public Health,. 2021;18(12).

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32. Kumkwan Y, Utriyaprasit K, Tankumpuan T, Lertmanorat Z, Mathayomchan B. Recovery after ischemic stroke: Effects of FuekFone home-based program on upper limb and cognitive function. Int J Nurs Sci. 2024;11(4):414-20.
33. Kumral E, Bayam FE, Özdemir HN. Cognitive and Behavioral Disorders in Patients with Precuneal Infarcts. Eur Neurol. 2021;84(3):157-67.
34. Alligood MR. Nursing theorists and their work. Eighth ed. St. Louis, Missouri: Elsevier Inc; 2014.
35. Biesbroek JM, Weaver NA, Aben HP, Kuijf HJ, Abrigo J, Bae HJ, et al. Network impact score is an independent predictor of post-stroke cognitive impairment: A multicenter cohort study in 2341 patients with acute ischemic stroke. NeuroImage Clinical. 2022;34:103018.
36. Huang Y, Wang Q, Zou P, He G, Zeng Y, Yang J. Prevalence and factors influencing cognitive impairment among the older adult stroke survivors: a cross-sectional study. Front Public Health. 2023;11:1254126.
37. Myooran J, Rahman F, Cordato D, Chróinín DN. Cognitive outcomes following ischaemic stroke: a narrative review. Aging Health Res. 2025;5(2).
38. Liao X, Zuo L, Dong Y, Pan Y, Yan H, Meng X, et al. Persisting cognitive impairment predicts functional dependence at 1 year after stroke and transient ischemic attack: a longitudinal, cohort study. BMC geriatrics. 2022;22(1).
39. Lim JS, Lee JJ, Woo CW. Post-stroke cognitive impairment: Pathophysiological insights into brain disconnectome from advanced neuroimaging analysis techniques. J Stroke. 2021;23(3):297-311.
40. Bao L, Wei J, Chen Z. The Impact of Progressive Rehabilitation Nursing on Physical Rehabilitation and Quality of Life in Patients with Cerebral Infarction. Altern Ther Health Med. 2024;30(3):62-7.
41. Elendu C, Amaechi DC, Elendu TC, Ibhiedu JO, Egbunu EO, Ndam AR, et al. Stroke and cognitive impairment: understanding the connection and managing symptoms. Ann Med Surg (Lond). 2023;85(12):6057-66.
42. Bonkhoff AK, Lim JS, Bae HJ, Weaver NA, Kuijf HJ, Biesbroek JM, et al. Generative lesion pattern decomposition of cognitive impairment after stroke. Brain Commun. 2021;3(2):fcab110.
43. Levine MD, Whitney PR, Ye PW, Briceño PE, Gross PA, Giordani PB, et al. Associations Between Stroke Type, Ischemic Stroke Subtypes, and Poststroke Cognitive Trajectories. Stroke. 2025;56:898-907.
44. Kaur M, Sharma S. Molecular mechanisms of cognitive impairment associated with stroke. Metab Brain Dis. 2022;37(2):279-87.
45. Seyedaghamiri F, Mahmoudi J, Hosseini L, Sadigh-Eteghad S, Farhoudi M. Possible engagement of nicotinic acetylcholine receptors in pathophysiology of brain ischemia-induced cognitive impairment. J Mol Neurosci. 2022;72(3):642-52.
46. Lee HY, Hyun SE, Oh BM. Rehabilitation for Impaired Attention in the Acute and Post-Acute Phase After Traumatic Brain Injury: A Narrative Review. Korean j neurotrauma. 2023;19(1):20-31.
47. Ghoreyshi Z, Nilipour R, Bayat N, Nejad SS, Mehrpour M, Azimi T. The incidence of aphasia, cognitive deficits, apraxia, dysarthria, and dysphagia in acute post stroke persian speaking adults. Indian J Otolaryngol Head Neck Surg. 2022;74(Suppl 3):5685-95.
48. Bogomolova K, van Merriënboer JJG, Sluimers JE, Donkers J, Wiggers T, Hovius SER, et al. The effect of a three-dimensional instructional video on performance of a spatially complex procedure in surgical residents in relation to their visual-spatial abilities. Am J Surg. 2021;222(4):739-45.
49. Budson AE, Solomon PR. Vascular Cognitive Impairment and Vascular Dementia. Memory Loss, Alzheimer's Disease and Dementia. third ed. Philadelphia: Elsevier Inc; 2022.
50. Zhang X, Bi X. Post-stroke cognitive impairment: A review focusing on molecular biomarkers. J Mol Neurosci. 2020;70(8):1244-54.