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Journal Homepage: http://ejournal.upi.edu/index.php/JPKI

JPKI

Development and Preliminary Validation of NIHSS-SDKI and CNS-SDKI Tools for Nursing Diagnosis in Stroke Care

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A B S T R A C T

Introduction: Accurate assessment of stroke severity is a critical component of nursing care. The NIHSS and CNS are standardized neurological instruments commonly used to evaluate stroke severity. Integrating NIHSS and CNS with the Indonesian nursing diagnosis standard (SDKI) offers practical benefits for nurses, as SDKI is tailored to the conditions of patients in Indonesia. **Objective** : The objective of this study is to evaluate the effectiveness of combining NIHSS and CNS severity assessments with SDKI in improving the accuracy of nursing diagnoses and determining stroke severity in patients. **Methods:** The research design used was Randomized Controlled Trial (RCT), single blind. The sample consisted of 55 stroke patients admitted to the neurological care unit using probability sampling technique with a simple random sampling approach, where sampling was carried out in accordance with predetermined inclusion criteria: non hemorrhagic stroke patients, respondents' age > 18 years, and willing to become research subjects. Assessment of severity was carried out using the NIHSS and CNS instruments, which were combined with the SDKI to determine nursing diagnoses. Assessment was carried out for 5 days of patient care. **Results:** Mann-Whitney test analysis in the NIHSS group and CNS group showed a p-value> (0.05), meaning that there was no difference between the application of NIHSS and CNS assessment on determining the degree of severity and the number of nursing diagnoses in stroke patients. **Conclusions:** This study shows that both NIHSS-SDKI and CNS-SDKI are effective in detecting changes in the clinical condition of stroke patients from day one to day five.

ARTICLE INFO

Article History:

Received: October 31st , 2024
Revised: June 19th , 2025
Accepted: June 27th , 2025
First Available Online: June 29th, 2025
Published: June 30th, 2025

Keywords:
CNS, Neurological Assessment, NIHSS, SDKI, Stroke Severity

1. INTRODUCTION

In addition to the National Institute of Health Stroke Scale (NIHSS), there are several other stroke severity assessment methods that are also important to consider in clinical practice. There are several other stroke severity assessment tools commonly used in clinical practice, in addition to the National Institutes of Health Stroke Scale (NIHSS). Here are some of them: a). Glasgow Coma Scale (GCS) which is used in terms of assessing the severity of trauma in the acute phase, in any case, evaluating the patient's level of consciousness and or the severity of the patient's comatose state; b) Scandinavian Neurological Stroke Scale (SNSS) can assess more adequately for anterior circulation infarction than posterior; c). Orgogozo Stroke Scale (OSS), not widely used, evaluates anterior circulation infarction, has very high interobserver reliability and provides a more detailed assessment of motor deficits; d). Canadian Neurological Scale (CNS) an assessment that is simple to use and with good interobserver reliability, and has been shown to be significant for assessing anterior infarcts; e). Hemispheric Stroke Scale is a scale with complexity in scoring, is more complicated requiring a long administration time (from 15 to 30 minutes) and assesses cerebral infarcts in various locations and f). Mathew Stroke Scale (MSS), is a scale with poor interobserver agreement. This scale takes about 15 minutes for administration and is difficult for observers to learn, can identify strokes in the anterior and posterior circulation; g). European Stroke Scale (ESS) can evaluate anterior infarction and posterior circulation; d). Canadian Neurological Stroke Scale (CNSS) an assessment that is simple to use and with good interobserver reliability, and proven to be significant for assessing anterior infarcts; e). Hemispheric Stroke Scale is a scale with complexity in scoring, is more complicated requiring a long administration time (from 15 to 30 minutes) and assesses cerebral infarcts in various locations and f). Mathew Stroke Scale (MSS), is a scale with poor interobserver agreement. This scale takes about 15 minutes for administration and is difficult for observers to learn, can identify strokes in the anterior and posterior circulation; g). The European Stroke Scale (ESS) can evaluate anterior infarction and is similar to the NIHSS except that level of consciousness and gait need additional assessment (Siniscalchi, 2022).

Research on the NIHSS-SDKI and CNS-SDKI is valid and reliable, and it can be used as a tool to measure severity and help nurses make nursing diagnoses in accordance with the Indonesian Nursing Diagnosis Standards. Based on the results of the validity and reliability tests, it was found that the NIHSS-SDKI and CNS-SDKI had a calculated r value> from the r table and Cronbach alpha value> 0.7 so that the NIHSS and CNS instruments were declared valid and reliable (Fitriana, 2024).

The National of Institutes of Health Stroke Scale (NIHSS) consists of eleven items, with each answer scored on a scale of 0 to 4 points. The overall score ranges from 0 to 42 points, with higher scores indicating higher actual neurological deficits. The patient's level of consciousness, speech and language, neglect, communication, field of vision, eye movements, facial movements, symmetry, motor strength, sensation, and coordination are evaluated in this test (Farooque et al., 2020). The Canadian Neurological Stroke Scale (CNS) is an assessment tool used to evaluate the neurological status of patients who have had a stroke. It has been validated by providing a

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

standardized neurological assessment of cognitive and motor function in conscious and drowsy patients who have had a stroke (Alijanpour et al., 2021).

The Canadian Neurological Scale (CNS) when compared to other measurement scales, it is easier and faster and does not require an in-depth neurological evaluation. Trained health professionals, such as nurses, can use the CNS, and lower scores indicate higher stroke severity. Stroke is categorized into mild (CNS ≥ 8), moderate (5-7), and severe (1-4). One of these scales is the Canadian Neurological Scale (CNS) and the National Institutes of Health Stroke Scale (NIHSS) (Alijanpour et al., 2021).

Effective stroke assessment not only relies on validated scales like CNS and NIHSS but also plays a critical role in the nursing process and the formulation of nursing diagnoses. In the early stages of the nursing process, assessment has a crucial role that greatly influences the next steps of care. Careful assessment determines the next steps of care, so nurses are expected to be able to identify nursing problems. Nursing diagnosis is a clinical evaluation of health problems obtained from patient responses or patient life events, both ongoing and potential. Standar Diagnosis Keperawatan Indonesia (SDKI) is a nursing diagnosis standard developed by the professional organization of nurses, the Indonesian National Nurses Association (PPNI), which contains 148 nursing diagnoses. This standard is an innovation for Indonesian nurses to implement nursing care that is relevant to the current culture, situation, and conditions in Indonesia (Tim Pokja PPNI, 2017).

The assessment of NIHSS-SDKI and CNS-SDKI is expected to enhance the quality of nursing care services, which will consequently lead to a reduction in patient care costs during their hospital stay. This research is also important because there has been no assessment combining the NIHSS and CNS methods in the hospitals studied. For low- and middle-income countries (LMICs) dealing with comparable issues, the integrated method between worldwide neurological evaluation scales and local nursing diagnosis standards might be used as a paradigm. Through cooperation between national nursing organizations, this model may be modified to fit the needs of each nation and match international resources with regional requirements. Concrete implementation can be carried out through nurse training programs, revision of national nursing diagnosis standards, and integration into the hospital's electronic medical record (EMR) system. This study will provide new insights for nursing practice in the region, serving as a foundation for developing policies and guidelines for stroke patient care that can be adopted by other hospitals and health institutions.

2. METHODS

Research Design

The research design used was Randomized Controlled Trial (RCT), single blind design, aiming to compare the effectiveness of two assessment methods, namely NIHSS-SDKI and CNS-SDKI, in evaluating stroke severity and determining nursing diag**noses**. Participants were randomly assigned to two groups: the intervention group (NIHSS-SDKI) and the control group (CNS-SDKI). Clinical conditions of the patients were assessed over a five-day treatment period to evaluate changes that occurred longitudinally.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

Population and Sample

In this study, the population consisted of stroke patients who were undergoing treatment at hospitals in Pontianak City. The author used a probability sampling technique with a simple random sampling approach, where sampling was carried out in accordance with the predetermined inclusion criteria, namely: Non hemorrhagic stroke patients, respondents' age > 18 years, and willing to become research subjects. The initial sample amounted to 70 stroke patients but there were 55 samples who underwent 5 days of treatment because the patient died, the patient moved to another ward, the patient went home at his own request, and the patient was discharged by the doctor. The sample in this study was divided into 2, namely the intervention group consisting of NIHSS-SDKI as many as 28 patients and the control group consisting of CNS-SDKI as many as 27 patients. Randomization was conducted to ensure an equal distribution of baseline characteristics and to minimize selection bias, allowing for an objective comparison of the effectiveness of both instruments.

Instrument Development

Researchers developed the NIHSS and CNS instruments combined with the Indonesian Nursing Diagnosis Standards (SDKI) which are in accordance with the local standards of the Indonesian population. Previously, researchers had also tested the validity and reliability of the two assessment instruments combined with the SDKI. The research sample in this study were all non-hemorrhagic stroke patients who were hospitalized in the hospital, with a total sample of 30 patients. The NIHSS has demonstrated high validity (r=0.500–0.893), NIHSS-SDKI (r= 0.398-0.888) and reliability (Cronbach's alpha= 0.834) in assessing stroke severity, The CNS has demonstrated validity (r= 0.677-1.000), CNS-SDKI (0.525-0,967) and reliability (Cronbach’s alpha= 0857) in assessing stroke severity (Fitriana, 2024). The NIHSS-SDKI and CNS-SDKI instruments are recommended in determining the actual nursing diagnosis and severity in stroke patients.

Research Procedure

The researcher observed the patient while in the ward for five days of treatment. After obtaining a permission letter, data collection was carried out starting from the time the patient was hospitalized using the NIHSS and CNS instruments. Observation was carried out for a maximum of five days, with a two-day interval, to observe the progress of the patient's condition.

In less than 24 hours after admission, researchers collected demographic data, measured NIHSS scores by the first nurse, CNS scores by the second nurse, and determined the severity and number of diagnoses. Assessment of the severity and number of nursing diagnoses was conducted on days 0, 2, 4, and 5. If the patient was admitted for more than five days, discharged, died, or transferred to the ICU due to critical conditions, data collection was stopped.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

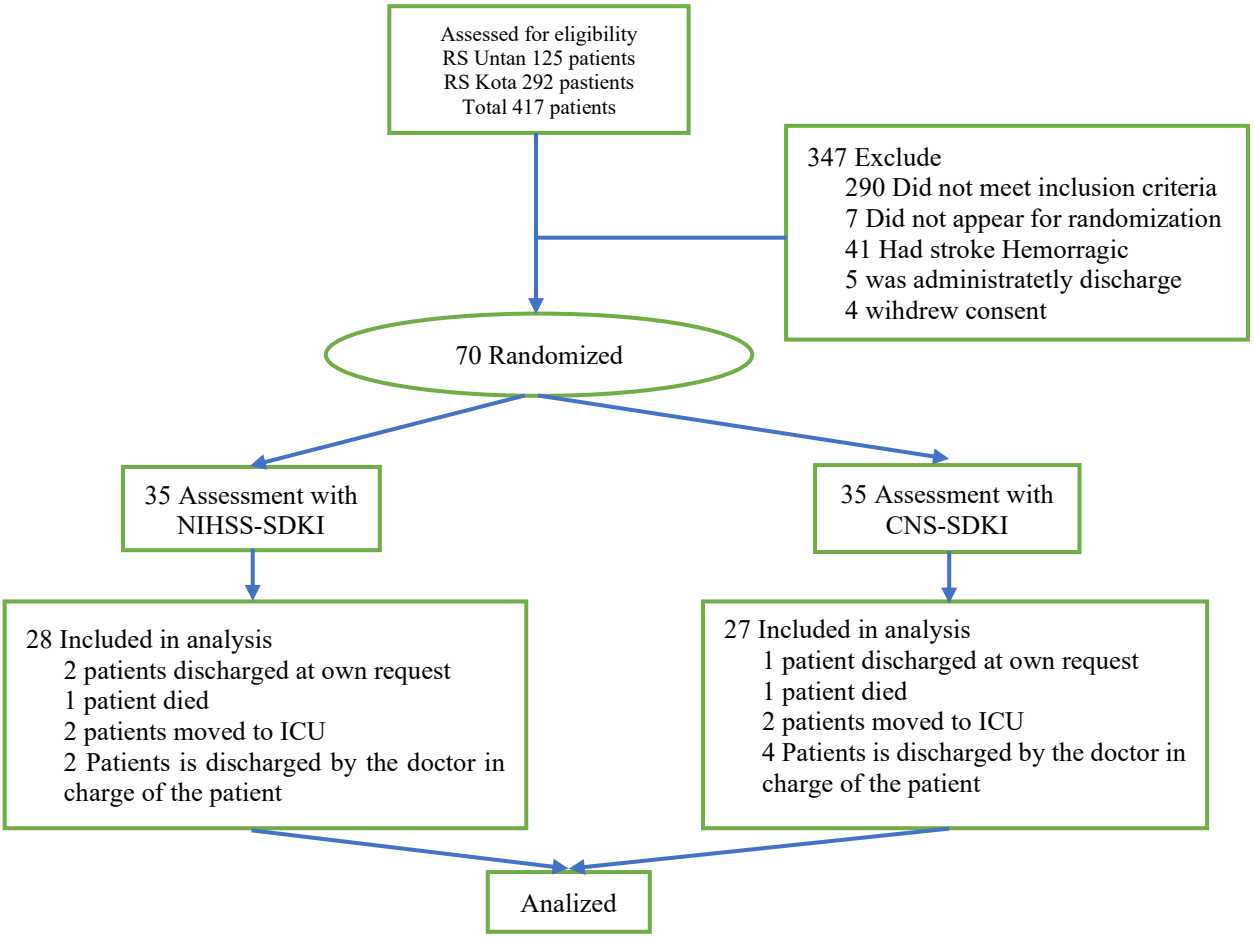

Diagram 1. The Consortium Diagram of Study Pariticipants

Data Analysis

Previously, the data were divided into two: intervention group data (assessment with NIHSS) and control group data (assessment with CNS). Researchers conducted assessments from day 0 to day 5.

Univariate analysis resulted in frequency distribution and proportion of respondents based on respondent characteristics in demographic data as well as severity of stroke patients. In this study the authors used the Saphirowilk normality test and found that the data were not normally distributed.

The bivariate analysis in this study was to see the effectiveness of the NIHSS-SDKI development in making nursing diagnoses. In this study, the SPSS computer program was used to apply bivariate analysis. Meanwhile, to see the effectiveness of NIHSS and CNS in making nursing diagnoses, the author used the Wilcoxon test and Mann Whitney Test because the data were not normally distributed.

Ethical Clearance

The Ethics Commission of The ITEKES Muhammadiyah Kalimantan Barat registered the research protocol wih registration number 71/II.I.AU/KET.ETIK/II/2024.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

3. RESULT

The number of samples in this study amounted to 55 samples, as many as 28 patients constituted the intervention group (NIHSS-SDKI) and 27 patients as the control group (CNS-SDKI).

Respondent Characteristics

Table 1. Characteristics of Respondents Based on NIHSS and CNS Groups

No	Data	Type Assessment	Categories	Total	Percent
1	Age	NIHSS	Age < 60 Years	21	75.0
			Age ≥ 60 Years	7	25.0
			Total	28	100.0
		CNS	Age < 60 Years	20	74.1
			Age ≥ 60 Years	7	25.9
			Total	27	100.0
2	Occupation	NIHSS	Civil Servant (ASN)	2	7.1
			Private Sector	11	39.3
			Unemployed	8	28.6
			Retired	4	14.3
			Other	3	10.7
			Total	28	100.0
		CNS	Civil Servant (ASN)	4	14.8
			Private Sector	7	25.9
			Unemployed	9	33.3
			Retired	3	11.1
			Other	4	14.8
			Total	27	100.0
3	Education	NIHSS	Elementary School	2	7.1
			Junior High School	5	17.9
			Senior High School	14	50.0
			Higher Education	7	25.0
			Total	28	100.0
		CNS	Elementary School	2	7.4
			Junior High School	2	7.4
			Senior High School	16	59.3
			Higher Education	7	25.9
			Total	27	100.0
4	Gender	NIHSS	Male	14	50.0
			Female	14	50.0
			Total	28	100.0
		CNS	Male	13	48.1
			Female	14	51.9
			Total	27	100.0
5	Health History	NIHSS	No history of disease other than stroke	10	35.7
			Having a disease other than stroke	18	64.3
			Total	28	100.0
		CNS	No history of disease other than stroke	15	55.6
			Having a disease other than stroke	12	44.4
			Total	27	100.0
6	Previous history of stroke	NIHSS	There was a previous stroke	9	32.1
			No previous stroke history	19	67.9
			Total	28	100.0
		CNS	There was a previous stroke	8	29.6
			No previous stroke history	19	70.4
			Total	27	100.0

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

Characteristics of research respondents based on the age of respondents <60 years as many as 21 (75%) on NIHSS measurements, while the age of respondents ≤60 as many as 20 people (74.1%) on CNS measurements. Most respondents worked as private employees as many as 11 (39.3%) on NIHSS measurements, while on CNS measurements as many as 9 (33.3%) did not work. Respondents' education was dominated at the high school level as many as 14 (50%) for NIHSS measurements, while for CNS measurements as many as 16 (59.3%) had a high school education. The characteristics of respondents based on gender in this study were dominated by women as many as 14 (50%) for NIHSS measurements and 14 (51.9%) were female for CNS measurements. Respondents had a history of disease other than stroke as many as 18 (64.3%) for NIHSS measurements, while for CNS measurements as many as 15 people (55.6%) did not have a history of disease other than stroke. Most of the respondents who participated experienced a first-time stroke 19 (67.9%) for NIHSS measurements and 19 people (70.4%) who experienced a first-time stroke.

Table 2. Overview of severity in the NIHSS and CNSS groups

No	Data	Type Assessment	Categories	Total	Percent
1	Degree of Severity Day 0	NIHSS	Mild severity	3	10.7
			Medium severity	10	35.7
			Severe severity	2	7.1
			Very severe severity	13	46.4
			Total	28	100.0
		CNS	Mild severity	12	44.4
			Medium severity	5	18.5
			Severe severity	10	37.0
			Total	27	100.0
2	Degree of Severity Day 2	NIHSS	Mild severity	4	14.3
			Medium severity	14	50.0
			Severe severity	2	7.1
			Very severe severity	8	28.6
			Total	28	100.0
		CNS	Mild severity	12	44.4
			Medium severity	5	18.5
			Severe severity	10	37.0
			Total	27	100.0
3	Degree of Severity Day 4	NIHSS	Mild severity	8	28.6
			Medium severity	11	39.3
			Severe severity	3	10.7
			Very severe severity	6	21.4
			Total	28	100.0
		CNS	Mild severity	15	55.6
			Medium severity	3	11.1
			Severe severity	9	33.3
			Total	27	100.0
4	Degree of Severity Day 5	NIHSS	Mild severity	10	35.7
			Medium severity	10	35.7
			Severe severity	2	7.1
			Very severe severity	6	21.4
			Total	28	100.0
		CNS	Mild severity	17	63.0
			Medium severity	2	7.4
			Severe severity	8	29.6
			Total	27	100.0

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

Based on the results of stroke severity measurements using NIHSS and CNS across several evaluation stages, significant differences were found first measurement: NIHSS showed that the majority of respondents were at a severe stroke level (46.4%), while CNS indicated a mild stroke level (37%), second measurement: NIHSS dominated with respondents in the moderate stroke category (50%), while CNS still showed a mild stroke level for most respondents (44.4%), third measurement: NIHSS continued to show the majority of respondents at a moderate stroke level (39.3%), while CNS indicated more respondents in the mild stroke category (55.6%), fourth measurement: NIHSS showed a shift to mild stroke levels for the majority of respondents (35.7%), while CNS increasingly indicated mild stroke levels (63%). In conclusion, NIHSS tends to assess stroke severity as more severe compared to CNS, especially in the initial evaluation stages. However, both tools demonstrate an improvement in stroke conditions over time, with CNS more frequently indicating a shift toward mild stroke levels.

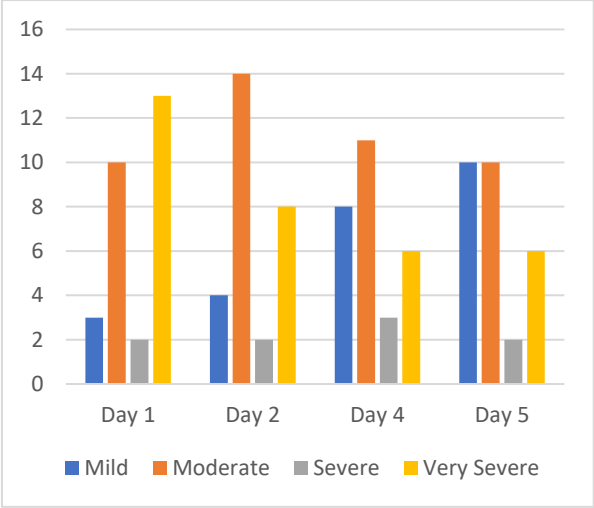

Fig 1. Graphic of NIHSS severity score

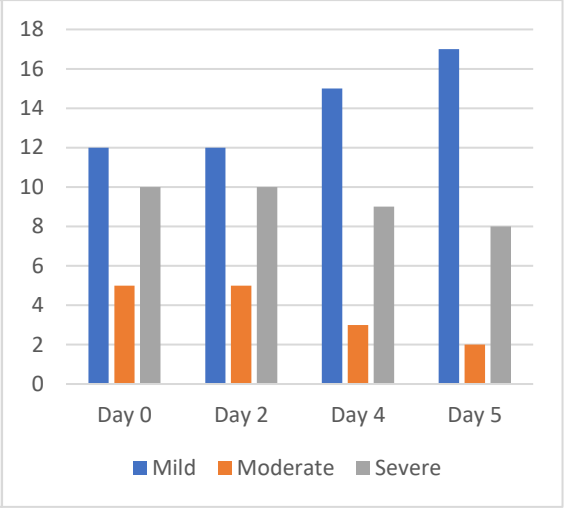

Fig 2. Graphic of CNS severity score

Data Analysis

In this study using the Wilcoxon test analysis and the Mann Whitney test after the data normality test was carried out and the results showed that each variable was not normally distributed and the type of data was ordinal. The normality test used in this study is the Shafiro-Wilk test because the number of respondents is less than 60.

Based on table 3 above, it can be detailed that the NIHSS SDKI score pre (first day) and post (fifth day) as many as 22 patients have decreased, 3 patients have increased and 3 patients have no change in NIHSS score. While the SDKI CNS score pre (first day) and post (fifth day) there were no patients who experienced a decrease in CNS score, 17 patients experienced an increase and 3 patients had no change in CNS score. This difference can be explained by the fact that, in the CNS (Canadian Neurological Scale) assessment, a decrease in the score reflects a worsening of the patient's condition, meaning the stroke severity is increasing. In contrast, in the NIHSS (National Institutes of Health Stroke Scale), a lower score indicates clinical improvement and reduced stroke severity. Thus, although the scoring systems move in opposite directions, the interpretation of patient improvement remains consistent when considered within the context of each scale. Based

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

on the pre- and post-assessments using both NIHSS-SDKI and CNS-SDKI, the results indicate that patients in both groups experienced a reduction in stroke severity over the five-day observation period.

Table 3. Wilcoxon Signed Ranks Test NIHSS-SDKI and CNS SDKI

		N	Mean Rank	Sum of Ranks
NIHSS Severity Post –NIHSS Severity Pre	Negative Ranks	22[a]	12.75	280.50
	Positive Ranks	3[b]	14.83	44.50
	Ties	3[c]		
	Total	28		
CNS Severity Post – NIHSS Severity Pre	Negative Ranks	0[a]	.00	.00
	Positive Ranks	17[b]	9.00	153.00
	Ties	10[c]		
	Total	27		
NIHSS-SDKI Post – NIHSS-SDKI Pre	Negative Ranks	16[a]	11.50	184.00
	Positive Ranks	4[b]	6.50	26.00
	Ties	8[c]		
	Total	28		
CNS-SDKI Post – CNS_SDKI Pre	Negative Ranks	14[a]	7.50	105.00
	Positive Ranks	0[b]	.00	.00
	Ties	13[c]		
	Total	27		

NIHSS SDKI pre (first day) and post (fifth day) as many as 16 patients experienced a decrease in the number of nursing diagnoses, 4 patients experienced an increase and 8 patients did not experience changes in the number of nursing diagnoses. CNS-SDKI pre (first day) and post (fifth day) as many as 14 patients experienced a decrease in the number of nursing diagnoses, no patients experienced an increase and 8 patients had no change in the number of nursing diagnoses.

Table 4. Differences in Severity Levels and Number of Nursing Diagnoses Between NIHSS-SDKI and CNS-SDKI

	The Difference Between NIHSS-SDKI and CNS-SDKI on Day One and Day Five Using the Wilcoxon Test		The Difference in the Use of the NIHSS-SDKI and CNS-SDKI Instruments	
	Z	Asymp. Sig. (2-tailed)	Mean	p-value
NIHSS (Severity Level)	-3.179[b]	.001	29.29	0.620
CNS (Severity Level)	-3.655[b]	.000	26.67	
NIHSS-SDKI (Nursing Diagnoses)	-3.029[b]	.002	29.29	0.536
CNS-SDKI (Nursing Diagnoses)	-3.372[b]	.001	26.67	

The analysis of severity levels before and after using the NIHSS-SDKI instrument showed a *p*-value of 0.001 (< 0.05), indicating a significant difference in determining the severity level of stroke patients in Pontianak City. Similarly, the use of the CNS-SDKI instrument produced a *p*-value of 0.000 (< 0.05), also indicating a significant difference between pre- and post-intervention scores, which demonstrates the effectiveness of CNS-SDKI in differentiating patient severity after intervention.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

Regarding the number of nursing diagnoses, the analysis of pre- and post-NIHSS-SDKI showed a *p*-value of 0.002 (< 0.05), indicating a significant difference in the number of nursing diagnoses identified before and after using the NIHSS-SDKI instrument. Likewise, in the CNS-SDKI group, a *p*-value of 0.001 (< 0.05) was found, also showing a significant difference in the number of nursing diagnoses before and after its application.

However, the Mann-Whitney test between the NIHSS-SDKI and CNS-SDKI groups showed a *p*-value of 0.620 (> 0.05), meaning that there was no significant difference between the two instruments in determining nursing diagnoses for stroke patients in Pontianak City. Similarly, the Mann-Whitney test between the NIHSS severity group and the CNS severity group produced a *p*-value of 0.536 (> 0.05), indicating that there was no significant difference between the NIHSS and CNS scales in determining the degree of stroke severity.

4. DISCUSSION

The characteristics of the respondents measured included age, occupation, education, gender, disease history, and stroke history. Most of the respondents in both groups were under 60 years old, indicating that young age is still vulnerable to stroke, where age factor is known as one of the determinants of stroke risk, but the results of this study indicate that most of the respondents involved were productive age (under 60 years old).

The incidence of stroke in young adults is particularly problematic as these patients often experience physical disability, depression, cognitive impairment, and loss of productivity, all of which have a major personal, social, and economic impact. This alarming trend in young adults is likely due to the increase in modifiable risk factors among this population, including hypertension, hyperlipidemia, obesity, and diabetes, which highlights the importance of early detection and aggressive prevention strategies in the general population at a young age. This is evidenced by the fact that 18 respondents in the NIHSS-SDKI assessment and 12 in the CNS-SDKI group had a history of comorbid diseases other than stroke. In addition, this problem is exacerbated by the growing trend of substance abuse among young adults (Yahya et al., 2020).

The gender of respondents in this study was predominantly female on both the NIHSS and CNS. Some unique or more common risk factors in young women include estrogen-containing contraceptives, pregnancy, and migraine with aura. The combination of the three can increase the risk of stroke up to 9-fold (George, 2020).

In terms of occupation, the NIHSS group was dominated by private employment, while CNS was more prevalent in the unemployed. This may reflect that occupation can fulfill exposure to stroke risk factors, such as job stress, unhealthy lifestyle, and lack of time for physical activity (Bianchi et al., 2016). Education the majority of respondents were at the high school level in both groups. The level of education can be related to the understanding of a healthy lifestyle and knowledge of disease prevention, including stroke (Mirawati & Mutnawasitoh, 2024).

On the first day of measurement, the NIHSS group was dominated by patients with a "very severe" stroke degree, while the CNS group was dominated by patients with a "mild" stroke degree. However, as time passed until the fifth day, the severity in the NIHSS group gradually improved, with most patients in the "mild" category. This indicates that there is an improvement in the clinical condition of the patients along with the treatment provided.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

In the early stages of observational research, the seven-day NIHSS score had the desired statistical power despite using a relatively small sample size (Kerr et al., 2012). The NIHSS assessed a week after treatment met the criteria as the primary outcome measure (Chalos et al., 2020).

In the CNS group, the majority of patients remained in the "mild" stroke degree category until day five. This may indicate that the CNS tool was more consistent in categorizing patients with lower severity or that patients included in the CNS group did have relatively milder clinical conditions. Although both groups received the same standard of nursing care and assessments were conducted by trained nurses, the possibility of baseline differences between groups remains. This may be a source of bias and is acknowledged as a limitation of the study. Therefore, further research with a randomized controlled design is recommended to validate these findings.

It is important to note that the NIHSS is more detailed in evaluating neurological disorders such as aphasia, ataxia, or decreased consciousness, while the CNS focuses more on the patient's motor function and consciousness responses (Côté et al., 1986). Therefore, the choice of measurement tool should be tailored to the desired clinical goal as well as the patient's condition (Bushnell et al., 2001).

Wilcoxon test results showed a significant difference in the NIHSS-SDKI and CNS-SDKI groups between pre (first day) and post (fifth day) measurements, both in terms of severity and number of nursing diagnoses. NIHSS and CNS differ in their fundamental assessment approaches. The NIHSS provides a more detailed evaluation of neurological function, including motor strength, speech, and visual abilities, making it more sensitive to subtle clinical changes. In contrast, the CNS focuses primarily on consciousness level and basic motor responses, which tends to result in more stable classifications in patients without drastic changes.This means that both the NIHSS-SDKI and CNS-SDKI are able to detect changes in the clinical condition of stroke patients effectively. In the NIHSS group, 22 patients experienced a decrease in stroke severity, while in the CNS group, 17 patients experienced an improvement in their condition for the better. This significant change indicates that the treatment provided during the study had a positive impact on the patient's condition.

Nurses play a crucial role as diagnosticians, where strong diagnostic abilities serve as the foundation for developing nursing intervention plans. The goal is to improve health, provide prevention, healing, and recovery for the client's well-being. Incomplete nursing assessments can lead to incorrect use of nursing diagnoses. Such inaccuracies can affect the determination of appropriate interventions, potentially disrupting the nursing process. Therefore, nurses must remain focused and meticulous in performing each step of the nursing process to ensure that no issues arise throughout its implementation (Hasina et al., 2023)

A nurse working in a stroke unit should use this method when conducting assessments to make appropriate clinical decisions (Rasyid et al, 2020). Several factors influence the behavior of nurses in using NIHSS, including the age and work experience of nurses, work environment, knowledge, practical skills, socio-culture, hospital management support (Darmanto et al., 2023)

The results of the analysis using the Mann-Whitney test showed that there was no significant difference between the NIHSS-SDKI and CNS-SDKI groups in terms of determining the nursing diagnosis or stroke severity. In other words, these two assessment methods have similar

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

effectiveness in assessing the condition of stroke patients. This suggests that both NIHSS and CNS can be used as standard methods in assessing the condition of stroke patients, depending on availability and user preference. The results of the analysis using the Mann-Whitney test showed that there was no significant difference between the NIHSS-SDKI and CNS-SDKI groups in terms of determining nursing diagnoses or stroke severity. The p-value for nursing diagnoses was 0.620, and the p-value for stroke severity was 0.536 ($p > 0.05$).

NIHSS and Siriraj Stroke Scale (SSS) are also equally effective in determining actual nursing diagnoses in stroke patients (Mohtar et al., 2022), as well as NIHSS and European Stroke Scale (ESS) are also equally effective in determining nursing diagnoses in stroke patients (Damhudi & Irawaty, 2007). These comparisons support the current study's results, indicating that different neurological assessment tools, when adapted properly, can be equally effective in guiding nursing diagnoses and evaluating stroke severity.

This study has several limitations, a small sample size and the absence of full-scale validation techniques like construct validity or factor analysis are two of this study's shortcomings. Furthermore, the instrument's usage of SDKI is still restricted to the local cultural context, which might limit its use in contexts outside of Indonesia. To improve the findings' generalizability, multicenter trials with bigger sample sizes are advised for future studies. To facilitate wider and more effective clinical usage, the NIHSS-SDKI and CNS-SDKI instruments must be further improved through sophisticated validation testing. Additionally, their incorporation with electronic nursing documentation systems must be investigated

5. CONCLUSION

Both NIHSS-SDKI and CNS-SDKI are effective in detecting changes in the clinical condition of stroke patients. However, no significant differences were found between these two methods in terms of nursing diagnosis and stroke severity assessment. Therefore, both scales can be flexibly used in the clinical environment according to the needs and preferences of health workers. By conducting assessments using the NIHSS and CNS scales for five consecutive days, researchers were able to monitor clinical changes over time, with a decrease in the number of nursing diagnoses and a decrease in the degree of severity in both tools.

Based on the statistical analysis using the Wilcoxon Signed-Rank Test, significant differences were found between the first-day (pre-test) and fifth-day (post-test) measurements in both groups, in terms of stroke severity and the number of nursing diagnoses. The p-values were 0.001 for NIHSS-SDKI severity, 0.000 for CNS-SDKI severity, 0.002 for NIHSS-SDKI nursing diagnoses, and 0.001 for CNS-SDKI nursing diagnoses. These results indicate that both NIHSS-SDKI and CNS-SDKI are effective in detecting changes in the clinical condition of stroke patients over five days of treatment, as evidenced by the decrease in severity levels and nursing diagnoses. However, the Mann-Whitney test revealed no significant differences between the NIHSS-SDKI and CNS-SDKI groups in the fifth-day (post-test) measurements, both in terms of nursing diagnoses ($p = 0.620$) and stroke severity ($p = 0.536$). Therefore, it can be concluded that although both tools are effective individually, there is no statistically meaningful difference in their effectiveness. Both instruments can be used interchangeably and flexibly in clinical practice, depending on the needs, availability, and preferences of healthcare professionals.

DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024

6. ACKNOWLEDGEMENT

We would like to thank the Rector of the Institute of Technology and Health Muhammadiyah West Kalimantan as a place to gain knowledge and provide research permission as well as the Sultan Syarif Muhammad Alkadrie Hospital and Tanjungpura University Hospital Pontianak for providing opportunities and assistance in conducting research.

7. CONFLICT OF INTEREST

The authors state no conflict of interest.

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DOI: https://doi.org/10.17509/jpki.v11i1
e-ISSN 2477-3743 | p-ISSN 2541-0024