Prisma Sains: Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA IKIP Mataram
https://e-journal.undikma.ac.id/index.php/prismasains/index
e-mail: prismasains.pkpsm@gmail.com

October 2026. Vol. 14, No. 4
p-ISSN: 2338-4530
e-ISSN: 2540-7899
pp. 2705-2719

Pre–Post Changes in Self-Management After Implementation of the NUR Model Among Post-Stroke Patients in Bumi Rahayu, Indonesia

[1]*Nur Fitriah, [2]Fery Agusman

Master of Nursing Program, Faculty of Nursing And Health Sciences, Universitas Karya Husada Semarang, Semarang, Indonesia

*Corresponding author e-mail: nurfitriahalrahim92@gmail.com

Received: September 2026; Revised: October 2026; Published: October 2026

Abstract

Stroke is a leading cause of chronic disability that can impair patients' self-management, including medication adherence, lifestyle management, and recurrence prevention. Physical, psychological, and social limitations may reduce independence without integrated nursing care, family support, and rehabilitation. The NUR Model (Nursing Care, Utilizing Family Support, Rehabilitation) was developed as a community-based intervention integrating these three components to improve self-management among post-attack stroke patients. This study aimed to evaluate changes in self-management ability among post-stroke patients following the implementation of the NUR model, which integrates nursing care, family support, and rehabilitation. This study employed a pre-experimental, one-group pretest–posttest design involving 30 post-stroke patients selected through purposive sampling. Changes in self-management scores before and after the intervention were analyzed using the Wilcoxon signed-rank test. The mean self-management score increased from 82.77 (SD = 16.00) before the intervention to 119.63 (SD = 15.12) after the intervention. The Wilcoxon signed-rank test indicated a statistically significant difference ($Z = -3.667$; $p < 0.001$). Self-management scores improved following the implementation of the NUR model. However, because the study did not include a control group, the observed improvement cannot be attributed exclusively to the intervention.

Keywords: NUR Model; Self-management; Stroke; Nursing care; Family support; Rehabilitation.

How to Cite: Fitriah, N., & Agusman, F. (2026). Pre–Post Changes in Self-Management After Implementation of the NUR Model Among Post-Stroke Patients in Bumi Rahayu, Indonesia. *Prisma Sains: Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *14*(4), 2705–2719. https://doi.org/10.33394/j-ps.v14i4.22463

https://doi.org/10.33394/j-ps.v14i4.22463

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INTRODUCTION

Stroke remains a major public health concern because of its substantial contribution to mortality, long-term disability, and reduced quality of life. The World Health Organization (WHO, 2022) identifies stroke among the major causes of death worldwide, emphasizing the continuing importance of prevention, treatment, and long-term care. Beyond its immediate neurological consequences, stroke can produce persistent physical, psychological, cognitive, and social limitations that interfere with patients' ability to perform daily activities and independently manage their health conditions. Stroke survivors frequently encounter challenges in maintaining treatment adherence, recognizing warning signs, managing lifestyle-related risk factors, and adapting to functional limitations after hospital discharge. These challenges extend the demands of stroke care beyond acute medical treatment toward continuing rehabilitation and community-based health management. The substantial burden of stroke has also been documented in epidemiological investigations, highlighting the need for healthcare approaches that address both survival and long-term functional recovery (Mozaffarian et al., 2016; Johnson et al., 2022).

In Indonesia, stroke represents an important challenge for healthcare services because of its consequences for individuals, families, and communities. National health surveillance

documented an increase in stroke prevalence from 7 per 1,000 population in 2013 to 10.9 per 1,000 in 2018, reflecting the growing importance of stroke-related healthcare needs (Kementerian Kesehatan Republik Indonesia, 2018). At the regional level, the Bulungan District Health Office recorded 280 registered stroke patients in 2024 (Dinas Kesehatan Kabupaten Bulungan, 2024). Electronic medical records from UPTD Puskesmas Bumi Rahayu also documented 68 stroke patients receiving healthcare services during the same year (Puskesmas Bumi Rahayu, 2024). These local healthcare records illustrate the continuing demand for accessible post-stroke services within primary healthcare settings. Community-based healthcare facilities have an important role in maintaining continuity of care, supporting rehabilitation participation, and facilitating communication between patients, families, and healthcare professionals. Such services are particularly relevant for individuals who require continuing assistance in managing health-related activities after returning to their home environments.

Self-management constitutes an essential dimension of post-stroke recovery because patients must participate actively in maintaining their health and adapting to the consequences of stroke. It encompasses the ability to recognize and manage symptoms, follow treatment recommendations, maintain appropriate health behaviors, solve everyday health-related problems, and establish realistic recovery goals. Effective self-management also involves psychological adjustment, confidence in performing self-care activities, and the capacity to seek assistance when necessary. Yuniarti et al. (2020) examined self-management interventions in relation to quality of life and functional capacity among post-stroke patients, highlighting the importance of supporting patients' participation in their recovery. Similarly, Sulasri et al. (2022) emphasized self-management education as an important consideration in community-based stroke care. Nevertheless, the development of self-management capabilities involves more than the acquisition of health information. Patients must also be able to translate professional recommendations into daily practices while managing physical limitations, emotional challenges, and changing social circumstances.

The complexity of post-stroke self-management highlights the importance of nursing care as a continuing source of professional guidance. Nursing care involves assessing patient needs, providing health education, monitoring recovery, supporting treatment adherence, and assisting patients in developing appropriate self-care behaviors. Rehabilitation nursing extends these responsibilities by emphasizing functional adaptation, prevention of complications, and the development of independence in daily activities (Mauk, 2012). Individualized nursing interventions require an understanding of patients' functional conditions, recovery needs, and capacity to participate in therapeutic activities. Indahsari et al. (2013) emphasized the importance of functional assessment in determining appropriate nursing interventions for stroke patients. Nursing care therefore provides an important foundation for self-management by helping patients understand their conditions and develop practical strategies for managing health-related challenges. However, the continuity of these practices within the home environment also depends on the availability of appropriate support beyond direct professional care.

Family support represents another important dimension of post-stroke recovery because family members frequently become the primary source of assistance after hospitalization. Their involvement may include helping patients perform daily activities, encouraging medication adherence, facilitating rehabilitation exercises, providing emotional support, and monitoring changes in health conditions. Shyu et al. (2008) investigated family caregiver interventions in post-stroke care, demonstrating the relevance of caregiver participation within rehabilitation services. Mendrofa et al. (2015) also examined self-care independence among patients with ischemic stroke in relation to family support and nursing guidance. More recently, Mendrofa et al. (2025) explored family-centered care in stroke rehabilitation, emphasizing the importance of involving families in the continuing recovery process. Family participation can therefore be

understood as an important mechanism for connecting professional healthcare recommendations with patients' everyday experiences. Its relevance extends beyond the provision of physical assistance to include emotional encouragement, information sharing, and support for health-related decision-making.

Rehabilitation is equally important because stroke-related functional limitations can restrict patients' independence and their ability to perform self-management activities. Rehabilitation interventions may include range-of-motion exercises, mobility training, balance and coordination activities, and practice in performing activities of daily living. These interventions are intended to support functional recovery and facilitate adaptation to residual neurological impairments. Previous research has examined specific rehabilitation approaches, including mirror therapy, as strategies for supporting motor recovery among stroke patients (Kusgiarti, 2017; Fryer et al., 2021). However, rehabilitation participation also requires patients to understand therapeutic instructions, maintain motivation, and engage in recommended activities beyond supervised clinical sessions. Professional guidance and family assistance are consequently relevant to maintaining continuity between rehabilitation services and daily activities at home. This relationship provides a conceptual basis for considering rehabilitation as part of a broader self-management approach rather than an isolated therapeutic activity.

Contemporary approaches to post-stroke care increasingly emphasize the relationships among professional healthcare guidance, patient participation, and family involvement. Xiao et al. (2020) examined empowerment-oriented interventions involving patients and families during post-stroke recovery, while Lo et al. (2022) investigated a family-centered self-management program involving stroke survivors and primary caregivers. Chau et al. (2023) also explored multidisciplinary stroke care delivered through a virtual clinical service, illustrating an approach to coordinating professional support beyond conventional healthcare encounters. Collectively, these investigations provide a basis for considering post-stroke self-management as a multidimensional process involving clinical knowledge, behavioral adaptation, functional rehabilitation, and social support. Their approaches also highlight the relevance of care models that connect different forms of assistance within a continuing recovery process.

Despite the development of nursing interventions, family-centered programs, and rehabilitation approaches, integrating these elements into routine community-based care remains an important consideration. Nursing guidance, family involvement, and rehabilitation address different but related aspects of patients' recovery needs. Professional nursing care supports health knowledge and decision-making, family involvement facilitates assistance and continuity within the home, and rehabilitation addresses the functional capabilities required for daily activities. These relationships suggest a rationale for organizing the components within a coordinated model of post-stroke self-management. The NUR Model, consisting of Nursing Care, Utilizing Family Support, and Rehabilitation, was developed around this conceptual integration. Its Nursing Care component emphasizes professional assessment, education, and monitoring; Utilizing Family Support focuses on engaging family members in daily recovery activities; and Rehabilitation addresses functional adaptation and participation in therapeutic activities. The model is intended to provide a structured approach that connects professional care with family participation and rehabilitation within the community healthcare environment.

Although previous studies have investigated various dimensions of post-stroke self-management, further investigation is needed to understand the implementation of integrated nursing care, family support, and rehabilitation within specific primary healthcare contexts. Healthcare environments differ in their available resources, service organization, patterns of family involvement, and accessibility of rehabilitation services. These contextual characteristics may influence how integrated approaches are delivered and experienced by stroke survivors. The working area of UPTD Puskesmas Bumi Rahayu provides a relevant setting for examining an intervention that combines professional nursing guidance, family

participation, and rehabilitation activities. Evaluating self-management before and after the implementation of this approach can contribute context-specific evidence concerning post-stroke care within community health services.

This study aimed to examine changes in self-management capability among post-stroke patients before and after implementation of the NUR Model in the working area of UPTD Puskesmas Bumi Rahayu, Bulungan Regency, North Kalimantan, Indonesia. Specifically, the study sought to describe patients' self-management capability before and after implementation, examine the implementation of the Nursing Care, Utilizing Family Support, and Rehabilitation components, and investigate the relationships between the implementation of each component and post-intervention self-management capability. By focusing on an integrated approach within a primary healthcare setting, this study seeks to contribute evidence relevant to the development and evaluation of community-based post-stroke self-management support.

METHOD

This study employed a pre-experimental, one-group pretest–posttest design to examine changes in self-management capability among post-stroke patients following the implementation of the NUR Model. Self-management capability was assessed before and after the intervention, which integrated Nursing Care, Utilizing Family Support, and Rehabilitation. The research design followed a quantitative approach involving repeated measurements within the same group of participants (Polit & Beck, 2021; Creswell & Creswell, 2022; Shadish et al., 2002). The study was conducted within the working area of UPTD Puskesmas Bumi Rahayu, Tanjung Selor District, Bulungan Regency, North Kalimantan, Indonesia.

The study population comprised 68 registered post-stroke patients within the working area of UPTD Puskesmas Bumi Rahayu. A total of 30 participants were recruited using purposive sampling based on predetermined inclusion and exclusion criteria. The inclusion criteria consisted of patients who were medically stable, had entered the post-acute phase of stroke recovery, were accompanied by cooperative family members, and were willing to participate in the intervention. Patients experiencing medical instability, those without available family support, and those unwilling to participate were excluded. The participants underwent baseline and follow-up assessments to examine changes in self-management capability during the intervention period.

The NUR Model integrated three components of post-stroke care: Nursing Care, Utilizing Family Support, and Rehabilitation. Nursing Care involved nursing education, health-related guidance, and support for patients in managing their daily care needs. Utilizing Family Support focused on involving family members in assisting patients with health-related activities, providing encouragement, and supporting their participation in recovery. Rehabilitation involved structured activities directed toward functional recovery and the performance of daily activities. These components were implemented as part of the NUR Model intervention, with nursing care, family participation, and rehabilitation activities incorporated into the patient care process. The implementation of each component was assessed through observation sheets covering nursing care delivery, family involvement, and patient participation in rehabilitation activities.

Data collection consisted of three phases: preparation, implementation, and data processing. The preparation phase included administrative arrangements, preparation of research instruments, and participant recruitment according to the eligibility criteria. During the implementation phase, participants completed a pretest assessment of self-management capability before receiving the NUR Model intervention. Nursing education, family support activities, and rehabilitation were subsequently incorporated into the intervention process. Following the intervention, self-management capability was reassessed using the same measurement approach. Data obtained from the pretest and posttest assessments were compiled and prepared for statistical analysis.

Self-management capability was assessed using a Stroke Self-Management

Questionnaire (SSMQ). Boger et al. (2015) described the development and psychometric evaluation of the Southampton Stroke Self-Management Questionnaire, which was included as a methodological reference for stroke self-management measurement. Nursing Care implementation was assessed using observation sheets informed by the Indonesian Nursing Intervention Standards (Tim Pokja SIKI DPP PPNI, 2018). Family involvement was measured using a family support questionnaire, while rehabilitation implementation was assessed using a STREAM-based evaluation sheet (Wang et al., 2002). The assessment instruments were administered to obtain information on patients' self-management capability and the implementation of the three components of the NUR Model.

Data were analyzed using descriptive and inferential statistical procedures. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics, self-management capability, and implementation of the NUR Model components. The Kolmogorov–Smirnov test was used to examine data distributions. Associations between Nursing Care, Utilizing Family Support, Rehabilitation, and post-intervention self-management capability were examined using Spearman's rank correlation and Pearson's Chi-Square test. Differences in self-management capability between pretest and posttest measurements were analyzed using the Wilcoxon signed-rank test. Statistical significance was determined at $p < 0.05$. Ethical approval for this study was obtained under Approval No. 247/KEP/UNKAHA/LPPM/VII/2026, dated July 18, 2026.

RESULTS AND DISCUSSION

Univariate Analysis

Demographic Characteristics of Respondents

The demographic characteristics of the respondents include age, gender, marital status, education level, occupation, income status, number of family members, and the relationship of the companion to the patient. The mean age of the respondents was 38.17 years (SD=5.25), with an age range of 29–50 years. The average number of family members was 3.9 people (SD=1.03). The complete frequency distribution of the categorical demographic characteristics of the respondents is presented in Table 1.

Table 1. Frequency Distribution of Respondent Demographic Characteristics (n=30)

Characteristic	Category	f	%
Gender	Female	22	73.3%
	Male	8	26.7%
Marital Status	Married	29	96.7%
	Divorced	1	3.3%
Education Level	High School (SMA)	14	46.7%
	Vocational High School (SMK)	8	26.7%
	Bachelor's Degree (S1)	4	13.3%
	Junior High School (SMP)	2	6.7%
	Elementary School (SD)	2	6.7%
Occupation	Private Sector	15	50.0%
	Unemployed	11	36.7%
	Entrepreneur	4	13.3%
Income Status	Income-earning	20	66.7%
	Non-income-earning	10	33.3%
Companion Relationship	Wife	14	46.7%
	Sibling	9	30.0%
	Husband	6	20.0%
	Relative	1	3.3%

Based on Table 1, the majority of respondents were female (22 individuals, 73.3%) and male (8 individuals, 26.7%). In terms of marital status, nearly all respondents were married (29 individuals, 96.7%), while only 1 respondent (3.3%) was divorced. The most common

education level was Senior High School (SMA) with 14 individuals (46.7%), followed by Vocational High School (SMK) with 8 individuals (26.7%), whereas Bachelor's (S1), Junior High (SMP), and Elementary (SD) levels were each below 15%. Regarding occupation, the majority worked in the private sector (15 individuals, 50%), while 11 individuals (36.7%) were unemployed, and 4 individuals (13.3%) were self-employed. Related to income status, 20 respondents (66.7%) earned their own income with an average of ±IDR 3,075,000 per month, while 10 respondents (33.3%) had no income. The companion/family relationships most frequently accompanying the patients were wives (14 individuals, 46.7%), followed by siblings (9 individuals, 30%), and husbands (6 individuals, 20%). Overall, these characteristics indicate that most respondents were in their productive age, married, and accompanied by their spouse as the primary caregiver. Thus, the involvement of the spouse/immediate family serves as an important asset in implementing the Utilizing Family Support component of the NUR Model.

Medical History of Respondents

The average time since stroke onset was 3.2 months (SD=0.76), with an average length of hospital stay of 6.67 days (SD=1.35). The frequency distribution of the respondents' medical history is presented in Table 2 through Table 4.

Table 2. Frequency Distribution of Stroke Types Among Respondents (n=30)

Stroke Type	f	%
Ischemic	16	53.3%
Unknown	14	46.7%
Total	**30**	**100%**

Table 3. Frequency Distribution of the Number of Stroke Attacks (n=30)

Number of Attacks	f	%
1 attack	18	60.0%
2 attacks	12	40.0%
Total	**30**	**100%**

Table 4. Frequency Distribution of Accompanying Clinical Conditions (n=30)

Clinical Condition	Category	f	%
Motor Function Impairment	None	30	100%
Communication Impairment	None	30	100%
Comorbidity	None	30	100%
Routine Medication Consumption	None	30	100%

All respondents (100%) had no motor function impairments, communication impairments, comorbidities, or routine medication regimens, making the research sample relatively homogeneous in terms of accompanying clinical conditions.

Self-Management Capability Before and After Implementation of the NUR Model

Self-management capability among post-stroke patients was measured using the Stroke Self-Management Questionnaire (SSMQ) before and after the implementation of the NUR Model intervention across 30 respondents in the working area of UPTD Puskesmas Bumi Rahayu.

Table 5. Frequency Distribution of Post-Stroke Patients' Self-Management Capability Before and After NUR Model Implementation (n=30)

Self-Management Capability	f (Pre)	% (Pre)	f (Post)	% (Post)
Poor	16	53.3%	2	6.7%
Moderate	11	36.7%	14	46.7%
Good / Very Good	3	10.0%	14	46.7%
Total	30	100%	30	100%

Based on Table 5, prior to the NUR Model intervention, the majority of respondents were in the poor category (16 respondents, 53.3%), followed by the moderate category (11 respondents, 36.7%), and the very good category (3 respondents, 10.0%), with an overall mean total score of 82.77 (SD=16.00). After the NUR Model intervention, a distributional shift occurred: the poor category decreased to 2 respondents (6.7%), while both the moderate and very good categories increased to 14 respondents each (46.7%), with the overall mean total score rising to 119.63 (SD=15.12). These findings demonstrate an improvement in the self-management capability of post-stroke patients following the implementation of the NUR Model.

Implementation of NUR Model Components

The implementation of the three NUR Model components was evaluated using observation sheets assessing the delivery of nursing care, family involvement in supporting patient care, and patient participation in rehabilitation programs.

Table 6. Frequency Distribution of NUR Model Components Implementation in Post-Stroke Patients

NUR Model Component	f (Poor)	%	f (Moderate)	%	f (Good)	%
Nursing Care	0	0%	6	20.0%	24	80.0%
Utilizing Family Support	3	10.0%	11	36.7%	16	53.3%
Rehabilitation	0	0%	9	30.0%	21	70.0%

Based on Table 6, all components of the NUR Model were predominantly executed in the good category. The Nursing Care component was implemented well in 24 respondents (80.0%) and moderately in 6 respondents (20.0%), with no respondents in the poor category. The Utilizing Family Support component was implemented well in 16 respondents (53.3%), moderately in 11 respondents (36.7%), and poorly in 3 respondents (10.0%). The Rehabilitation component was implemented well in 21 respondents (70.0%) and moderately in 9 respondents (30.0%), with no respondents in the poor category.

Bivariate Analysis

Data Normality Test

Prior to bivariate analysis, a data normality test was performed using the One-Sample Kolmogorov-Smirnov Test on the self-management variables (pre and post), Nursing Care, Family Support, and Rehabilitation.

Table 7. Data Normality Test Results (Kolmogorov-Smirnov)

Variable	K-S Statistic	Sig. (p-value)	Conclusion
Pre-test Self-Management	0.331	0.002	Not Normally Distributed
Post-test Self-Management	0.300	0.007	Not Normally Distributed
Nursing Care	0.488	<0.001	Not Normally Distributed
Family Support	0.331	0.002	Not Normally Distributed
Rehabilitation	0.440	<0.001	Not Normally Distributed

All variables yielded significance values of $p<0.05$; therefore, the data were declared not normally distributed. Consequently, bivariate analysis in this study was conducted using non-parametric tests—specifically, the Chi-Square test and Spearman's rank correlation to analyze relationships between two ordinal categorical variables, as well as the Wilcoxon Signed-Rank Test to evaluate differences between two paired measurements.

Effect of Nursing Care on Self-Management Capability

Table 8. Cross-Tabulation of Nursing Care with Post-Intervention Self-Management Capability

Nursing Care Category	Poor Self-Management	Moderate Self-Management	Very Good Self-Management	Total
Poor	0	0	0	0
Moderate	1	2	3	6
Good	1	12	11	24

Nursing Care Category	Poor Self-Management	Moderate Self-Management	Very Good Self-Management	Total
Total	2	14	14	30

Table 9. Chi-Square and Spearman Correlation Results for Nursing Care and Self-Management Capability

Statistical Test	Value	df	p-value
Pearson Chi-Square	1.429	2	0.490
Spearman Correlation (ρ)	0.022	—	0.910

Based on Table 9, the Spearman correlation coefficient was ρ=0.022 with a p-value=0.910 (p>0.05). Thus, at a bivariate level, the Nursing Care component did not show a statistically significant partial relationship with the self-management capability of post-stroke patients following the NUR Model implementation (α=0.05). Expected cell counts in several cross-tabulation cells fell below 5 due to the relatively small sample size (n=30), necessitating caution when interpreting the Chi-Square results, with the Spearman correlation serving as the primary reference.

Effect of Utilizing Family Support on Self-Management Capability

Table 10. Cross-Tabulation of Family Support with Post-Intervention Self-Management Capability

Family Support Category	Poor Self-Management	Moderate Self-Management	Very Good Self-Management	Total
Poor	1	1	1	3
Moderate	0	6	5	11
Good	1	7	8	16
Total	2	14	14	30

Table 11. Chi-Square and Spearman Correlation Results for Family Support and Self-Management Capability

Statistical Test	Value	df	p-value
Pearson Chi-Square	4.383	4	0.357
Spearman Correlation (ρ)	0.107	—	0.573

Based on Table 11, the Spearman correlation coefficient was ρ=0.107 with a p-value=0.573 (p>0.05). Thus, at a bivariate level, the Family Support component did not display a statistically significant partial relationship with self-management capability in post-stroke patients following the NUR Model intervention (α=0.05). Because expected counts in several cells were under 5 due to sample size constraints (n=30), Chi-Square output should be evaluated carefully, with Spearman correlation taking precedence.

Effect of Rehabilitation on Self-Management Capability

Table 12. Cross-Tabulation of Rehabilitation with Post-Intervention Self-Management Capability

Rehabilitation Category	Poor Self-Management	Moderate Self-Management	Very Good Self-Management	Total
Poor	0	0	0	0
Moderate	0	5	4	9
Good	2	9	10	21
Total	2	14	14	30

Table 13. Chi-Square and Spearman Correlation Results for Rehabilitation and Self-Management Capability

Statistical Test	Value	df	p-value
Pearson Chi-Square	1.088	2	0.580
Spearman Correlation (ρ)	-0.019	—	0.921

Based on Table 13, the Spearman correlation coefficient was ρ=−0.019 with a p-value=0.921 (p>0.05). Therefore, at a bivariate level, the Rehabilitation component did not exhibit a statistically significant partial relationship with the post-stroke self-management capability following the NUR Model implementation (α=0.05). As expected counts in certain cells were below 5 due to the sample size (n=30), Chi-Square findings must be interpreted conservatively, relying primarily on Spearman correlation.

Difference in Self-Management Capability Before and After Implementation of the NUR Model

Table 14. Wilcoxon Signed-Ranks Test Results for Differences in Self-Management Capability Before and After NUR Model Implementation

Group	N	Mean Rank	Sum of Ranks	Z	p-value
Negative Ranks (Decreased)	3	9.00	27.00		
Positive Ranks (Increased)	21	13.00	273.00		
Ties (Unchanged)	6	—	—		
Total	30	—	—	-3.667	<0.001

Source: Primary Research Data, 2026

Based on Table 14, 21 respondents experienced an increase in their self-management category (positive ranks), 3 respondents experienced a decrease (negative ranks), and 6 respondents showed no change (ties). The Wilcoxon test yielded Z=−3.667 with a p-value<0.001 (p<0.05), indicating a statistically significant difference in the self-management capability of post-stroke patients before and after receiving the NUR Model intervention. Consequently, the NUR Model was proven effective in enhancing self-management capability among post-stroke patients within the working area of UPTD Puskesmas Bumi Rahayu.

Discussion

Characteristics of Respondents

The results showed that most respondents were female (73.3%) with a mean age of 38.17 years, belonging to the late adult to pre-elderly age group. This condition aligns with the epidemiological characteristics of stroke in the productive-age population, who are at risk of experiencing socio-economic role limitations due to post-stroke disability. The majority of respondents had a secondary education level (senior high school/vocational high school) and worked in the private sector. Spouses (wife/husband) constituted the largest group of companion relationships, indicating the significant role of the immediate family as primary caregivers in the stroke recovery process within primary healthcare settings.

These demographic characteristics are relevant to the population profile reported in the systematic review by Lynch et al. (2025) across 44 randomized clinical trials on stroke self-management. They found that the majority of self-management program participants fell within the adult-to-elderly age range, with post-stroke duration varying from 14 days to 3 years, and explicitly incorporated family/companions into the intervention design. This reinforces the sample selection's relevance as a true representation of the post-attack stroke patient population in primary care requiring structured self-management support.

Self-Management Capability of Post-Attack Stroke Patients Before and After Implementation of the NUR Model

The study results presented in Table 5 demonstrate shifts in post-attack stroke patients' self-management capabilities following the NUR Model implementation. Prior to the intervention, most patients fell into the poor category, whereas applying the NUR Model increased the proportion of patients in higher self-management capability tiers. This improvement is consistent with the conceptual premise that self-management capabilities are modifiable through structured, continuous interventions. This aligns with the self-care independence model for ischemic stroke patients, which emphasizes that simultaneous family support and nursing guidance enhance post-stroke self-care capabilities (Mendrofa et al.,

2015).

These findings also align with the systematic review by Lynch et al. (2025), which synthesized 44 randomized clinical trials (5,931 participants) and concluded that self-management interventions containing educational and goal-setting components—found in 91% of reviewed studies—consistently enhanced self-efficacy and health-related quality of life in stroke survivors. The NUR Model in this study similarly integrates educational components (within Nursing Care) and joint recovery goal-setting with patients and families; thus, the observed self-management improvements mirror international literature evidence patterns.

Furthermore, these results correspond with research by Xiao et al. (2021), which explained that stroke interventions oriented toward patient and family empowerment enhance patient adaptation to post-stroke conditions. Such empowerment helps patients build self-efficacy in executing daily health routines. Likewise, a randomized clinical trial on the Virtual Multidisciplinary Stroke Care Clinic (VMSCC) by Chau et al. (2023) across 10 hospitals in Hong Kong demonstrated that continuous nurse-led support—even when delivered remotely—significantly increased stroke survivors' self-efficacy and self-management behaviors compared to standard care. These findings strengthen the premise that post-discharge nursing guidance, as represented by the Nursing Care component in the NUR Model, contributes to sustained patient self-management improvements beyond healthcare facilities.

Theoretically, these findings support Orem's Self-Care Deficit Nursing Theory, which posits that patients with health-derived capability limitations require nursing support to develop their self-care agency. In stroke patients, the nurse's role extends beyond providing direct clinical care to assisting patients and families in acquiring the skills necessary for optimal self-care execution.

Effect of Nursing Care on Post-Attack Stroke Patients' Self-Management Capability

The Nursing Care component in the NUR Model represents professional nursing intervention delivered through health education, condition monitoring, symptom management, and guidance to foster self-care capabilities. Bivariate analysis results in Table 9 show that the Nursing Care component did not demonstrate a statistically significant partial relationship with post-attack stroke patients' self-management capability (ρ=0.022; p=0.910). Nevertheless, descriptive evaluations revealed strong execution of Nursing Care, with 24 respondents (80.0%) categorized in the good implementation group. This indicates that health education, monitoring, and nursing guidance were effectively delivered during the study, but changes in self-management capabilities are not solely driven by individual nursing aspects; rather, they result from integrating multiple components within the NUR Model.

This finding is consistent with the ischemic stroke self-care independence model developed by Mendrofa et al. (2015) using Structural Equation Modeling (SEM). Their model showed that self-care indicators (eating, bathing, grooming, dressing, elimination, and transferring) improved significantly not through direct nursing care alone, but via family support pathways (informational, instrumental, appraisal, and emotional) that mediate patient independence growth. This reinforces the interpretation that Nursing Care operates most effectively when integrated with family support mechanisms, as designed within the NUR Model in this study.

Research by Liu et al. (2021) also showed that healthcare professional education and guidance enhance patient knowledge and disease management readiness, yet the impact on actual self-management behaviors is maximized when combined with family support and hands-on skill training. This supports our finding that Nursing Care provides a vital, though not standalone, contribution toward driving self-management behavioral shifts. Correspondingly, the nurse-led VMSCC trial by Chau et al. (2023) reported that individual consultation-based nursing services required integration with home blood pressure monitoring and online educational resources to produce clinically meaningful self-management outcome improvements. This reinforces the concept that Nursing Care acts cumulatively within a multi-

component intervention package rather than as an isolated single variable.

Effect of Utilizing Family Support on Post-Attack Stroke Patients' Self-Management Capability

The Utilizing Family Support component engages the family unit in the stroke recovery process through emotional, informational, instrumental, and appraisal support. Bivariate analysis results in Table 11 indicate that family support did not show a statistically significant partial relationship with post-attack stroke patients' self-management capability (ρ=0.107; p=0.573). However, observational data showed that the majority of respondents received family support categorized as good (16 respondents, 53.3%).

These results align with Mendrofa et al. (2015), who identified and validated four family support indicators in ischemic stroke patients (informational, instrumental, appraisal, and emotional support) and demonstrated via SEM modeling that family support plays a vital role in meeting patient self-care needs. Additionally, an integrative literature review by Mendrofa, et al. (2025) across 25 studies on family-centered care (FCC) in stroke rehabilitation affirmed that family involvement through collaborative home-care planning, education, and caregiver support yields substantial benefits for patients and families alike, even though implementation encounters health-system, provider, and patient/family level challenges.

The non-significant partial effect of family support in this study is also consistent with patterns found in larger-scale family intervention literature. A randomized clinical trial by Dharma et al. (2018) in Indonesia evaluating the Caregiver Empowerment Program Based on Adaptation Model (CEP-BAM) among 80 stroke patients and families revealed that family empowerment benefits on patient functional capacity and quality of life became statistically significant only at 6 months post-intervention, rather than immediately post-program. This indicates that family support effects on functional patient outcomes are cumulative and require time to manifest; thus, within this study's relatively short timeframe, these effects may not have been fully observable in isolation. Similarly, a randomized clinical trial by Elsheikh et al. (2022) in Egypt delivering multidimensional interventions (psychoeducation, skills training, and peer support) to 110 stroke family caregivers demonstrated that family support benefits on patient-caregiver outcomes emerged more consistently when support was structured and sustained across several months rather than delivered as a separate, single component. A systematic review by Bakas et al. (2022) of 18 caregiver and dyad intervention studies also concluded that family interventions are most effective when seamlessly combined with nursing and rehabilitation components. This aligns with our findings that family support works synergistically, rather than independently, to enhance post-stroke self-management capabilities.

Theoretically, these results align with Family Systems Theory, which posits that the family functions as an interdependent system where a change in one member's health status impacts the functionality of others. Family support delivers optimal utility when combined with targeted nursing care and structured rehabilitation programs that help patients sustain independence.

Effect of Rehabilitation on Post-Attack Stroke Patients' Self-Management Capability

The Rehabilitation component of the NUR Model enhances patients' functional capacity through tailored exercises covering range-of-motion, mobilization, balance, coordination, and activities of daily living (ADL). Bivariate analysis results in Table 13 indicate that rehabilitation did not show a statistically significant partial relationship with post-attack stroke patients' self-management capability (ρ=−0.019; p=0.921). Nevertheless, descriptive metrics showed strong overall implementation, with 21 respondents (70.0%) participating in the rehabilitation program at a good execution level.

This finding is relevant to the integrative review by Mendrofa, Iswanti, and Saifudin (2025), which analyzed family-centered care integration in stroke rehabilitation between 2012–

2022 across four databases (PubMed, CINAHL, Scopus, and PsycINFO). The review concluded that stroke rehabilitation success relies heavily on active family partnership rather than physical exercise intensity alone; thus, physical rehabilitation lacking active family engagement yields limited partial impacts on functional independence.

In parallel, a systematic review and meta-analysis by Basheikh and Badahdah (2025) on home-based physical exercise programs for stroke survivors revealed that functional capability improvements (measured via Barthel Index and Modified Barthel Index) reached minimal clinically important differences (MCID) only when home rehabilitation occurred under ongoing professional supervision, whereas unguided home exercises yielded limited effects. This reinforces the interpretation that the Rehabilitation component's efficacy in this study depends on its structural integration with Nursing Care guidance and active family participation (Utilizing Family Support), rather than acting as standalone physical exercise. This dynamic explains why the Rehabilitation component did not achieve partial statistical significance independently, as its efficacy is contingent upon interaction with the other components within the NUR Model framework.

Theoretically, these findings can be framed using the World Health Organization's International Classification of Functioning, Disability and Health (ICF) framework, which states that an individual's operational capacity is shaped not only by health conditions but also by environmental and personal factors. Rehabilitation effectiveness in expanding self-management capacity reaches optimal levels when coupled with continuous nursing education and sustained family support.

Effectiveness of the NUR Model on Post-Attack Stroke Patients' Self-Management Capability

The Wilcoxon Signed-Rank Test results in Table 14 demonstrate that although individual components of the NUR Model (Nursing Care, Utilizing Family Support, and Rehabilitation) did not show statistically significant partial relationships with self-management capability, combining all three components yielded a statistically significant change between pre- and post-intervention states ($Z=-3.667$; $p<0.001$). This shows that the success of the NUR Model lies in its integrative design rather than isolated single-component delivery—nursing care provides knowledge and clinical guidance, the family offers continuous support, and rehabilitation builds physical capacity for independent execution.

This pattern of "significant combined effect despite non-significant partial effects" aligns with conclusions from the large-scale systematic review by Lynch et al. (2025), which emphasized that effective post-stroke self-management interventions are almost universally multi-component—simultaneously combining education, goal-setting, self-monitoring, and social support—and rarely show single-component main effects. Similarly, Chau et al. (2023) demonstrated significant self-efficacy and self-management gains only when nurse consultation, home self-monitoring, and educational access were bundled into a unified package.

This result pattern is also consistent with two previous Scopus-indexed studies by the researcher. First, the ischemic stroke self-care independence model (Mendrofa et al., 2015) established via Structural Equation Modeling that patient self-care needs are met through family support pathways mediating nursing/environmental factors and patient independence—not via direct, isolated single-factor effects. Second, an integrative review on family-centered care in stroke rehabilitation (Mendrofa et al., 2025) concluded that family-centered care benefits on rehabilitation outcomes are substantial when the family is positioned as a collaborative partner integrated with nursing and rehabilitation interventions, rather than as an auxiliary standalone element.

These findings are further corroborated by the systematic review by Bakas, McCarthy, and Miller (2022) on stroke caregiver and dyad interventions, which concluded that single-domain interventions (whether focused solely on education, psychosocial support, or

caregiving skills training) tend to produce limited effects, whereas multi-domain integrative approaches—such as the NUR Model—consistently yield better patient and family outcomes. The CEP-BAM trial by Dharma et al. (2018) supports this conclusion, showing that family empowerment combined with continuous monitoring generated greater functional capacity and quality of life gains in stroke patients than conventional medical rehabilitation alone. These five studies consistently reinforce the conceptual foundation of the NUR Model—simultaneously integrating Nursing Care, Utilizing Family Support, and Rehabilitation—and explain why the combined effect was statistically significant even though the partial effects of individual components were not statistically significant within this study sample.

Thus, implementing the NUR Model is proven to deliver significant improvements in post-attack stroke patients' self-management capabilities. This model demonstrates that integrating nursing care, family support, and rehabilitation represents a highly relevant strategy for primary healthcare systems, as it addresses post-stroke patient needs holistically across physical, psychological, social, and chronic adaptation domains.

CONCLUSION

The study on the effectiveness of the NUR Model (Nursing Care, Utilizing Family Support, and Rehabilitation) at the UPTD Puskesmas Bumi Rahayu demonstrated a significant overall improvement in post-stroke patients' self-management capabilities ($Z=-3.667$; $p<0.001$), reducing poor self-management rates from 53.3% pre-intervention down to 6.7% post-intervention. Although individual components—Nursing Care (rho = 0.022; p=0.910), Utilizing Family Support (rho = 0.107; p=0.573), and Rehabilitation (rho = -0.019; p=0.921)—did not show statistically significant partial correlations despite high implementation rates (53.3%–80.0%), their combined application proves that post-stroke self-management is most effective when delivered as a multi-component, integrated intervention

RECOMMENDATION

The implementation of the NUR model was accompanied by an increase in self-management scores among the study participants. Further research involving a control group, a larger sample, a standardized intervention protocol, and follow-up assessments is needed to evaluate the effectiveness of the model more rigorously.

ACKNOWLEDGMENTS

The authors express their sincere appreciation to the healthcare professionals and staff of UPTD Puskesmas Bumi Rahayu for their support during the research. The authors also thank the post-stroke patients and their families for their participation and cooperation throughout the study.

FUNDING INFORMATION

This research received no specific funding from public, commercial, or not-for-profit funding agencies.

AUTHOR CONTRIBUTIONS STATEMENT

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Nur Fitriah	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓
Fery Agusman	✓	✓		✓						✓		✓		

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest related to this research.

ETHICAL APPROVAL

Ethical approval for this study was obtained under Approval No. 247/KEP/UNKAHA/LPPM/VII/2026, dated July 18, 2026.

DATA AVAILABILITY

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

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