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Original Article

The Impact of the Education Program for Stroke (EPSTRO) on Family Caregivers' Competence in Home-Based Stroke Care

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ABSTRACT
Background: Stroke is now one of the leading causes of adult disability, with negative effects on both individuals and families. Families have a responsibility to offer nursing care (family caregivers), which includes biological, psychological, social, and spiritual aspects of care. The family's ability to care for stroke victims at home is a major factor in determining the family's role as carers in the work environment of the Community Health Center. The initial survey found post-stroke patients with immobilization disorders, lack of good care by the family, and no structured education program for families. The research aimed to determine the impact of education program for stroke (EPSTRO) on caregiver competency, encompassing knowledge, attitudes, and abilities in caring for individuals with stroke. **Method**s: This study used a quasi-experimental approach with pre-and post-tests. 30 family carers who had experienced a stroke served as the study's sample. Instruments for collecting data on characteristics, knowledge, attitudes, and actions of caregivers were carried out using the modified Sirait questionnaire (2018). The Wilcoxon signed rank test and dependent t-test with p = 0.05 were used to evaluate the data. **Results**: According to analysis using the Wilcoxon signed rank test statistic, there is a difference in the median knowledge before and after treatment (p=0.0001 0.05), as well as the median skill level (p=0.0001 0.05). There was a difference in the average attitude before and after the treatment, according to the analysis's dependent t-test findings (p=0.0001, 0.05). **Conclusions**: The education provided by stroke programs significantly enhances caregiver competency.

INTRODUCTION

Stroke has become the leading cause of disability in adulthood, with impactful consequences for individuals and families. Stroke care is time-consuming and imposes significant financial, emotional, and social burdens. Post-stroke patients often face considerable challenges, including locomotor dysfunction, cognitive impairment, depression, and dependency on activities (Costa *et al*., 2015). These challenges place a critical caregiving responsibility on families, requiring them to provide holistic care addressing biological, psychological, social, and spiritual needs (Ariska *et al*., 2020).

Family caregivers play a central role in sustaining recovery at home. However, prolonged caregiving responsibilities may result in significant emotional and psychological strain. Caregivers commonly report feelings of inadequacy, anxiety, role conflict, and disruptions in

family dynamics (Silva *et al*., 2025). A high level of caregiving burden has been consistently associated with decreased quality of life, particularly when accompanied by elevated stress and depressive symptoms (Handayani *et al*., 2024). Importantly, caregiver well-being is closely linked to the effectiveness and continuity of patient care, suggesting that caregiver support constitutes a critical component of comprehensive stroke management.

Empirical evidence further demonstrates a significant association between patient functional status and caregiver burden. Higher levels of patient dependency, particularly in performing ADL, are correlated with increased physical and psychological strain among caregivers (Purba & Purba, 2023). Moreover, psychosocial factors influence this relationship. Studies indicate that caregiver quality of life declines as caregiving burden intensifies; however, protective factors such as resilience may moderate this association (Fang *et al*., 2022). Educational and psychosocial interventions have been shown to reduce caregiver burden by enhancing knowledge, improving caregiving skills, and fostering adaptive coping strategies (Kelani *et al*., 2025). In addition, social and emotional support from family networks and the broader community contributes significantly to caregiver adaptation and long-term psychological well-being (Iriyanti & Widiana, 2024).

Preliminary studies conducted at Sawah Lebar Community Health Center in Bengkulu revealed that 82% of stroke patients experience mobility impairments, yet caregiver education remains unstructured and sporadic. This gap in caregiver training, coupled with the rising prevalence of non-communicable diseases in Bengkulu Province, highlights the urgent need for systematic intervention. To date, no structured, sustained stroke education programs for caregivers have been implemented in the region, particularly at the community health center level.

This study introduces a novel educational program called EPSTRO (Education Program for Stroke), designed to enhance caregiver competence through structured, continuous training. Unlike previous efforts, EPSTRO combines various teaching methods-lecturing, discussion, simulation, and Q&A sessions with practical home visits and digital support via WhatsApp groups. This integrated approach ensures that caregivers not only acquire knowledge but also effectively apply it in real-life care scenarios. As the first initiative of its kind in Bengkulu Province, this program fills a critical gap in caregiver education and provides statistically validated improvements in knowledge, attitudes, and skills. It also serves as a replicable model for other regions facing similar challenges in stroke management and caregiving.

METHODS

This study design uses a quasi-experimental design with a pre-test-post-test design in one group. The group was given direct stroke care education. The population in this study consisted of caregivers of stroke patients in the working area of the Bengkulu City Health Center. The sampling technique used was sequential sampling according to the inclusion criteria, whereby all caregivers who met the inclusion criteria were included in the study. The inclusion criteria included caregivers who had a family relationship with stroke patients, were willing to participate in the education program, and signed an informed consent form. Based on the formula calculation, the sample size obtained was 30 people. The instrument used to collect data on the characteristics, knowledge, attitudes, and actions of caregivers was a modified Sirait questionnaire (2018). The knowledge questionnaire used multiple-choice questions, while the attitude and action questionnaires used closed statements with a Likert scale. The Cronbach's Alpha reliability test values for the questionnaires were found to be within an adequate range, namely 0.702 for knowledge, 0.722 for attitudes, and 0.889 for skills. The validity test showed that each questionnaire was valid (p-value < 0.05).

Data collection was conducted from August to early October 2023. The first period of education was on August 11-13, 2023, in the working area of Puskesmas Sawah Lebar Bengkulu City, and August 29-31, 2023, at Puskesmas Pasar Ikan Bengkulu City. The first week of activities began with informed consent and pre-test by filling out a knowledge questionnaire by caregivers of 15 items, an attitude questionnaire of 10 items, and a skills questionnaire of 12 items. The

activity continued with the provision of stroke care education with lectures, discussion, and question-and-answer methods for 2 days. On the 3rd day, the activity continued with a home visit to caregivers and stroke patients at each respondent's home. Researchers simulated for caregivers how to provide direct care to families suffering from stroke at home and asked caregivers to re-simulate in front of researchers. The researcher also asked the caregiver to fill in the checklist of care actions in the format provided. Furthermore, the researcher visited the caregiver once a week for four weeks. The researcher also created a WhatsApp group of respondents to remind the caregiver to take care of the stroke family every day. WhatsApp enables fast, flexible, and community-based communication between caregivers and health workers. The implications of using WhatsApp include improved access to information, strengthened social support, and real-time monitoring of caregiver progress. In the fifth-sixth week, the researcher conducted a post-test. In this study, we did not use a control group due to limited resources, both in terms of the number of caregivers available and the relatively short time to implement the intervention. In addition, this approach was chosen to ensure all participants benefited from the education and support, given the importance of increasing caregivers' capacity in caring for stroke patients.

Numerical data processing includes characteristic data and competency data presented in the form of mean, median, maximum-minimum value, and standard deviation in tabular form, while categorical data is presented in percentages using a frequency distribution table. Knowing the mean difference in caregiver competence uses the Wilcoxon test cause the data was not normally distributed. Before the study, the respondents expressed written consent by signing the informed consent form. This research has obtained a certificate of ethical eligibility from the Health Polytechnic of the Ministry of Health, Bengkulu, with number KEPK.BKL/421/07/2023.

RESULTS

Based on sample characteristics, the research found the following data.

Table 1. Characteristics of Respondents (caregivers)

Variables	n	%
Age		
Mean	44.47	
SD	15.222	
Min-Max	16-68	
CI 95 %	38.78-50.15	
Gender		
Male	4	13.3
Female	26	86.7
Education		
Low	6	20.0
High	24	80.0
Marriage status		
Unmarriage	2	6.7
Marriage	28	93.3
Job		
Not working	27	90.0
Working	3	10.0
Family Income		
Below minimum wage	24	80.0
Above minimum wage	6	20.0
Relationship with stroke patients		
Child	17	56.7
Brother/Parent	4	13.3
Couple	9	30 .0

Table 1 illustrates that respondents in the intervention group had a mean age of 44.47 (SD 15.222) and it is believed that 95 % of the mean age of respondents was in the range of 38.78 to 50.15 years, the majority of respondents were female (86.7%), were highly educated (80%), were married (93.3%), were not working (90 %), the family income was below the minimum wage (80 %), more than half of the relationship with the patient was as a child (56.7%).

Table 2. Characteristics of Respondents (Patient)

Variables	n	%
Age		
Mean	64.7	
SD	12.3	
Min-Max	42-93	
CI 95 %	60.1-69.3	
Gender		
Male	14	46.7
Female	16	53.3
Duration of suffering stroke		
< 2 years	7	23.3
≥ 2 years	23	76.6
Physical problems		
One problem	24	80.0
Two problem	3	10.0
>2 problems	3	10.0
History of recurrent stroke		
Recurrent	17	56.7
Non-recurring	13	43.3
History of hospitalization		
Never	17	56.7
Ever	13	43.3
Comorbidities		
None	5	16.7
Yes	25	83.3

Table 2 illustrates that stroke patients had a mean age of 64.70 (SD 12.3) and it is believed that 95 % of the mean age of respondents was in the range of 60.10 to 69.30 years, more than half (53.3 %) were female, the majority of respondents had suffered a stroke for ≥2 years (76.6 %), the majority had one physical problems (80%), more than half had a history of recurrent stroke (56.7 %), had never been hospitalized (56.7%), the majority had comorbidities (hypertension) (83.3%).

Table 3. The Effect of Intervention on Caregivers' Knowledge, Attitudes, and Skills

Variables	n	Median (min-max)	*P value*
Knowledge			
Before Intervention	30	53 (20-100)	0.0001****
After Intervention	30	93 (53-100	
Skills			
Before Intervention	30	74 (27-92)	0.0001***
After Intervention	30	76 (48-94)	

Table 4. The Effect of Intervention on Caregivers' Attitudes

Variables	n	Mean ± SD	Difference Mean ± SD	CI 95%	*P value*
Attitude					
Before Intervention	30	56.20±13.598	23.142 ± 18.424	18.382 – 27.901	0.0001***
After Intervention	30	79.34 ±10.080			

The results of the Wilcoxon signed-rank test in Table 3 showed that the median knowledge and median skill changed significantly after treatment. The p-value for each variable is less than 0.05 (p=0.0001 It can be concluded that the stroke program education affects caregivers' knowledge and skills before and after treatment. The results of the dependent t-test analysis in Table 4 showed a significant difference in the mean attitude before and after treatment (p=0.0001). So it can be concluded that there is an effect of stroke program education on caregivers' attitudes.

DISCUSSION

A. Overview of Caregiver Characteristics

The results of the research on the age of caregivers are in the middle adult age group. Adult caregivers are considered mature enough in life experience, wise in making decisions, able to think rationally, able to control emotions, and be more tolerant of others (Alifudin & Ediati, 2019). The results of the study are in line with the research of Yuliana & Jannah (2022) in Woha, Bima district, who found that the gender of caregivers who care for stroke patients is the same (Sri Yuliana & Nurul Jannah, 2022). Also, in line with the results of research by Ridwan et.al. (2023) in the working area of Tanjungsari health center, most family caregivers were female (Adila & Handayani, 2020).

Family caregivers are more female because women are considered to have a softer nature and also a caring nature in terms of caring for sick family members, and most of the respondents have jobs as housewives (Anggraini, 2022). This can also be caused by various factors, one of which is the norms and culture that apply in Indonesian society. In Indonesia, the role of women is to take care of the household, such as cooking, washing, cleaning the house, serving their husbands, and caring for family members, while the role of men is to earn a living. In this case, women play a greater role in caring for their sick family (Alifudin & Ediati, 2019).

The results showed that the education of most caregivers was high, namely, high school and college levels. This is in line with the results of research by Yuliana & Jannah (2022) in Woha, Bima district, where it was found that the majority of caregivers' education was at college (Sri Yuliana & Nurul Jannah, 2022). The research of (Vianny *et al*., 2024) in the outpatient department of Tugurejo Hospital, it was shown that the majority of respondents' education was high school. The level of education determines a person's broader knowledge, abilities, and skills. When health workers deliver health education related to patient health problems, families can understand the information provided, which will be useful for treatment (Alifudin & Ediati, 2019).

The results showed that the majority were married. This is in line with the research of Agianto & Setiawan (2017) at the Syafar Banjarmasin clinic, where it was found that a large proportion of the status of caregivers caring for stroke patients were married (Agianto, 2017). The results of the study are also accordance with the research of Ariska et.al. (2020) in the outpatient department of Tugurejo Hospital regarding marital status; the majority of respondents were married (Jannah & Syarif, 2023).

From the results of the research, it was found that the majority did not have formal employment. This is different from the results of research by Apriliyanti et.al. (2022) at RSUD Dr. Hadi Slamet Martodirdjo Pamekasan hospital found that caregivers who care for stroke patients are working (Apriliyanti *et al*., 2022). This is not in line with the results of research by Ariska et.al. (2020) in the outpatient department of Tugurejo Hospital, which shows that

the majority of caregivers, based on their occupation, are working (Jannah & Syarif, 2023). This is because caregivers have the responsibility to support their familiesR, especially in fulfilling their daily needs and the need for health services. Work is a time-consuming activity, so work has an influence on the family in providing care. Caregivers who do not work tend to have a large economic burden and find their activities in caring for patients boring; besides, caregivers who do not work will have a limited social life and have different role assumptions in the care process, so that the perceived burden will increase (Alifudin & Ediati, 2019).

From the results of the study, it was found that the majority of the family income was below the minimum wage. The results of the study are in line with the research of Apriliyanti *et al* (2022) at Dr. Hadi Slamet Martodirdjo Pamekasan hospital found that family income is below the minimum wage (Apriliyanti *et al*., 2022). The results of the study are also in line with the research of Ariska et.al. (2020) in the outpatient department of Tugurejo Hospital, which shows that the majority of caregivers' income for stroke patients is below the Regional Minimum Wage (UMR) (Jannah & Syarif, 2023). The lower a person's income can affect a person's ability to obtain information about health status, and the limited cost of reaching health facilities in the community, both information media and health service centers(Alifudin & Ediati, 2019).

The results of the study stated that half have a relationship with the group. The results of the study were different from the research of Apriliyanti *et al* (2022 at Dr. Hadi Slamet Martodirdjo Pamekasan Hospital, which found that the caregiver relationship was partly as a partner (Apriliyanti *et al*., 2022). However, in line with the research of Ariska et.al. (2020) in the outpatient department of Tugurejo Hospital, which states that the majority of caregivers' relationships with stroke patients are as children (Jannah & Syarif, 2023). The large number of caregivers who have a relationship with children can be influenced by various factors, one of which is the customary laws, norms, and beliefs prevailing in society that children must be devoted to their parents. In addition, it is also related to the existence of the main functions of the family in health care, namely to maintain the health condition of family members so that they remain highly productive, including knowing family health, deciding on appropriate health actions for the family, caring for families experiencing health problems, modifying the family environment to ensure health and utilizing health care facilities (Alifudin & Ediati, 2019).

B. Characteristics of Stroke Patients

The results showed that the average patient is elderly. In contrast to the results of research by Patricia et.al (2013) in Prof. Dr. R. Kandou Manado Hospital found that most stroke patients in middle-aged (MTumboimbela, 2015). This study is almost the same as Laily's research (2017) at Ngimbang Lamongan Hospital showed that in the case group, most cases and control group occurred in middle age (Laily, 2017). The results of the study of stroke disease were found more in the middle and elderly age, because physiologically there are age-related physical changes, including changes in blood vessels in general, including cerebral blood vessels that become less elastic, and the accumulation of plaque in the branching of cerebral blood vessels that lasts for years. Plaques that occur in the blood vessels of the brain will interfere with blood circulation to the brain, so that the brain will experience metabolic disorders. if it happens continuously, ischemia will occur and eventually cerebral infarction.

The results showed that in the intervention group of stroke patients, a large proportion were female. The results of this study differ from the research of Komang & Kusuma (2019) at Sangglah Denpasar Hospital, which states that the gender of stroke patients is more male than female (Mahayani & Putra, 2019). Research by Patricia et.al. (2013) at Prof. Dr. R. Kandou Manado Hospital found that the majority of stroke patients were male (MTumboimbela, 2015). The results of the study are different from other studies and also the theory which states that men have a greater tendency to have a stroke than women in early adulthood, with a ratio of 2:1. However, although men are more vulnerable than women at a young age, the incidence of stroke in women will increase after reaching menopause. This is supported by previous research conducted by Bariroh (2016) at Tugurejo Hospital, Semarang City, namely,

more women than men (Bariroh *et al*., 2016).

The results showed that in the intervention group, the majority of the length of strokes suffered <2 years. A different study was also conducted by Rismawan et. al. (2021) the Neurology Clinic of RK II, Dr. Ak. Gani found that the length of time the respondents suffered was 2.10 to 3.38 years (Budi & Syahfitri, 2022). Research on the length of time suffering from stroke varies and has implications for disability in stroke survivors and getting poor care. The longer the time passes after a stroke, the smaller the risk of dying from a stroke. Generally, stroke patients who have stabilized will need rehabilitation facilities. Post-stroke medical rehabilitation in principle must be carried out as soon as possible according to the patient's condition, which aims to treat physical function, occupation, and speech therapy (Anieto *et al*., 2019).

The results showed that in the group that the majority had physical problems. This is in line with Geneva & Usman's research (2023) at RSUD by Dr. Pringadi Medan, which found that a minority of patients experienced paralysis of the left side of the body (Geneva & Usman, 2023). The majority of patients experienced paralysis of the right side of the body. And a small minority of patients experienced paralysis on both sides of the body. The most common type of paralysis in stroke patients is right-sided paralysis, experienced by the majority of patients. Right-sided paralysis (Hemiparesis Dextra) occurs due to damage to the left side of the brain. Paralysis in patients with Hemiparesis Dextra usually can speak less fluently, behaving with a slow, cautious style, have poor memory (forgetting the words that must be spoken), and have less clear vision (del-Pino-Casado *et al*., 2018).

The results showed that the majority had a history of recurrent stroke. In contrast to Firuza's research (2022) at Tugurejo Semarang Hospital, it was found that the majority of stroke patients experienced recurrent stroke (Rahmawati *et al*., 2024). This is the theory that states that patients who have had a stroke are 30% likely to experience a recurrent stroke if they cannot control stroke risk factors (Dinkes Provinsi Bengkulu, 2022). The results showed that in the intervention group, more than half of the patients had never been. Some of the patients' families recognize stroke as a neurological disease that will interfere with the patient's movement needs, so they bring the patient to the hospital as an initial action when a stroke attacks. However, there are still families of patients who consider stroke to be an old disease and believe that the patient received at the hospital can guarantee a complete recovery for the patient, until finally the patient is allowed to go home (Sundaram *et al*., 2022).

The results showed that most had a history of comorbidities such as hypertension, diabetes mellitus, kidney disease, and heart disease. The results of the study found that in the intervention group that the majority had comorbidities (hypertension). The results of this study are in line with the results of Mahendrakrisna's research (2019) at the Surakarta City Hospital found that the majority of stroke patients have comorbidities such as hypertension, diabetes mellitus, hypercholesterolemia, gout, heart failure, and epilepsy (Mahendrakrisna *et al*., 2020). The same results were also obtained in a study conducted by Geneva & Usman (2023) at Dr. Pringadi Medan hospital, namely that the majority of the patients had a previous history of hypertension (Geneva & Usman, 2023). A minority of patients had a history of diabetes mellitus, and a minority also had a history of other previous diseases. Hypertension is a potential stroke factor. Hypertension can cause narrowing of cerebral blood vessels. Hypertension accelerates the hardening of arterial blood vessel walls and results in the destruction of fat in smooth muscle cells, thus accelerating the process of arteriosclerosis. The higher the blood pressure, the greater at risk of stroke, and someone who has hypertension has a 3-4-fold risk of having a stroke compared to people who do not have hypertension. Based on this, the presence of hypertension comorbidities in stroke patients will cause a high risk of stroke (Dufouil *et al*., 2017).

The results showed that there was an effect of stroke program education on caregiver competence. The results of this study are in line with the results of research by Kosasih et.al (2018) at Al Islam Bandung hospital found that before and after health education intervention, there was a significant average difference in knowledge (Adila & Handayani, 2020). Research conducted by Kosasih (2018) informs that health education affects increasing the level of

knowledge of patients and their families about stroke, readiness, the role of family caregivers of stroke patients, psychological support, and preparation for stroke patient care at home. (Adila & Handayani, 2020) In line with research conducted by Sari (2018) also informs that there is an effect of providing a Stroke Education Program (SEP) on controlling health behavior in post-stroke lifestyle (Artiawati *et al*., 2025).

Research conducted by Rodgers (2019) regarding the Randomized Controlled Trial of a Comprehensive Stroke Education Program for Patients and Caregivers indicates that the stroke education program (SEP) can increase patient knowledge and informal caregivers in meeting patient satisfaction with several stroke service components (Gurjar, 2019). Research conducted by Pitthayapong (2017) also informs that post-stroke care programs can improve the post-stroke care skills of family caregivers, who can improve functional status and reduce complications in stroke patients. (Pitthayapong *et al*., 2017) Research from Gurjar (2019)(Gurjar, 2019) also indicates that the Education Program can increase knowledge and competence in home care for stroke patients.

CONCLUSION

There is a difference in the mean knowledge, attitude, and skills of caregivers before and after the stroke program education in the working area of Bengkulu City Health Center. It can be concluded that there is an effect of stroke program education on caregiver competence. Moving forward, it is recommended that the EPSTRO program be considered for broader implementation, particularly in community-based healthcare settings. Future research should explore the program's long-term effects on caregiver well-being and patient outcomes, as well as its sustainability and adaptability through digital platforms such as WhatsApp. These insights will be essential for informing health policy and scaling up caregiver support systems more effectively.

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