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ORIGINAL ARTICLE

Providing Education on the Level of Knowledge about Initial Stroke Management in Fishermen's Families in the Gesik Cemandi Area, Sidoarjo

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ABSTRACT

Introduction: *Stroke is a leading cause of death and disability worldwide and requires rapid recognition and timely management. Family members may play an important role in recognizing stroke warning signs and initiating appropriate early actions; however, limited knowledge may contribute to delayed medical care.* **Objectives:** *To determine the effect of health education on family knowledge regarding early stroke management.* ***Methods:*** *A pre-experimental one-group pretest–posttest study was conducted in Gisik Cemandi Village, Sidoarjo, Indonesia, on March 12–19, 2026. Forty-three adult family/community members were recruited using purposive sampling. The intervention consisted of a 30-minute face-to-face lecture supported by a booklet and take-home leaflet covering stroke risk factors, warning signs, FAST recognition, and early management. Knowledge was assessed before and immediately after the intervention using a researcher-developed questionnaire. Of 15 initial items, 12 valid items were retained (Cronbach's α = 0.930). Data were analyzed using the Wilcoxon Signed-Rank Test..****Results:*** *Before the intervention, 90.7% of respondents had poor knowledge and 9.3% had moderate knowledge. After the intervention, 65.1% had good knowledge and 34.9% had moderate knowledge. Knowledge improved significantly following health education (Z = −5.899; p < 0.001).* ***Conclusions:*** *Health education delivered through a face-to-face lecture supported by a booklet and leaflet was associated with improved family knowledge regarding early stroke management. Brief, structured health education may be a useful community nursing strategy for strengthening family knowledge of stroke warning signs and appropriate early responses.*

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Introduction

troke remains one of the leading causes of mortality and long-term disability worldwide, posing a major public health challenge because of its substantial impact on individuals, families, and healthcare systems. Global estimates from the Global Burden of Disease Study 2021 indicate that the burden of stroke remains substantial and has increased considerably in absolute numbers over recent decades. Stroke remains the second leading cause of death globally and the third leading cause of death and disability combined. In 2021, approximately 11.9 million new strokes occurred worldwide, while 93.8 million people were living with stroke. The growing stroke burden is strongly associated with modifiable risk factors, particularly high blood pressure, smoking, high low-density lipoprotein cholesterol, unhealthy diet, elevated blood

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glucose, excess body weight, and physical inactivity(Feigin, V. L., Brainin, M., Norrving, B., Martins, S. O., Pandian, J., Lindsay, P., Grupper, M. F., & Rautalin, 2025) Timely recognition and treatment remain essential because stroke is a medical emergency in which delays may reduce opportunities for effective acute intervention and increase the risk of neurological disability.

In Indonesia, successful stroke management continues to face significant challenges, particularly during the prehospital phase. The 2023 Indonesian Health Survey reported a national stroke prevalence of 8.3 per 1,000 population aged ≥15 years (Survei Kesehatan Indonesia, 2023). Stroke also represents a major national health burden, accounting for approximately 18.5% of total deaths and 11.2% of disability and generating substantial catastrophic healthcare expenditure (Survei Kesehatan Indonesia, 2023) Rapid assessment and treatment are particularly important in acute ischemic stroke, for which intravenous thrombolysis may be considered within a time-dependent therapeutic window, including treatment within approximately 4.5 hours for eligible patients (Prabhakaran, S., 2026). However, many patients may arrive too late to benefit from time-sensitive treatment because of delays in symptom recognition, decision-making, transportation, and access to appropriate stroke services. Therefore, strengthening family knowledge regarding early stroke recognition and appropriate prehospital action is an important component of improving the stroke care pathway.

Families play a central role as first responders because they are often present when stroke symptoms first occur and are frequently involved in deciding whether and how quickly medical assistance is sought. Evidence from Indonesia indicates that prehospital delay is influenced by multiple factors, including limited knowledge of stroke symptoms, educational and socioeconomic factors, cultural beliefs, transportation barriers, and low utilization of emergency medical services(Wiyarta et al., 2025). Family-focused interventions are therefore increasingly recognized as an important component of stroke care. A systematic review by Bakas et al. found that stroke family caregiver and dyadic interventions can improve caregiver and survivor outcomes, particularly when education is combined with skills training and structured support (Bakas et al., 2022). Similarly, Mack and Hildebrand highlighted the value of educational and supportive interventions for caregivers of people who have experienced stroke(Mack & Hildebrand, 2023). More recent evidence also suggests that individual psychoeducational interventions may improve caregivers' quality of life, although their effects on depression and caregiver burden remain less conclusive(Kelani et al., 2026). These findings support the importance of structured education directed toward family members as part of comprehensive stroke care.

Previous studies have demonstrated that health education can improve knowledge and recognition of stroke warning signs in community populations and family members. In Indonesia, health education using the FAST approach significantly improved knowledge of early stroke detection among community health cadres in Surabaya (Huda, N., & Delita, 2019). This evidence is particularly relevant because FAST provides a simple framework for recognizing facial drooping, arm weakness, speech difficulty, and the need for immediate action. Other studies have also demonstrated that family-oriented and community-based stroke education can improve knowledge, recognition of symptoms, and preparedness to respond to suspected stroke (Tan, J., Ramazanu, S., Liaw, S. Y., & Chua, 2022) (Parmin, S., Mustikasari, & Azzam, 2021) (Rohmah et al., 2024). Nevertheless, evidence remains more limited regarding brief, structured education specifically directed toward family members as first-line decision-makers in community-based prehospital stroke management, particularly in community settings where previous exposure to stroke information is limited.

The present study addresses this gap by positioning family members as the primary target of a structured educational intervention focusing on early stroke management. The educational content emphasized recognition of stroke warning signs using the FAST approach (Face drooping, Arm weakness, Speech difficulty, Time to seek emergency care), understanding the urgency and time-sensitive nature of stroke, recognition of the golden period, and appropriate early action

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before arrival at a healthcare facility. The use of a simple stroke recognition approach such as FAST is relevant for facilitating early identification of stroke warning signs and encouraging timely responses in community settings (Tan et al 2022;) (*Huda, N., & Delita, S. K. (2019*). The intervention consisted of a 30-minute face-to-face lecture supported by a booklet as the primary learning medium and a leaflet as take-home reinforcement material. Educational materials that provide structured and accessible information may support the improvement of stroke-related knowledge among families and caregivers(Crocker at al, 2021). The study was conducted in Gisik Cemandi Village, Sedati District, Sidoarjo Regency, East Java, Indonesia, providing evidence from a community-based setting. Therefore, this study aimed to determine the effect of health education on family knowledge regarding early stroke management.

Methods

This study employed a quantitative pre-experimental design using a one-group pretest–posttest approach to determine changes in family knowledge regarding early stroke management following a health education intervention. The study was conducted in Gisik Cemandi Village, Sedati District, Sidoarjo Regency, East Java, Indonesia, from March 12 to 19, 2026. The study population consisted of family members residing in the study area. A total of 43 respondents were recruited using non-probability purposive sampling. The inclusion criteria were family members aged ≥18 years, able to communicate effectively, willing to participate in the study, and able to provide written informed consent. Respondents who did not complete all stages of the study or withdrew their participation were excluded from the analysis.

Data were collected using a researcher-developed questionnaire designed to assess family knowledge regarding early stroke management. The questionnaire was developed based on a literature review and recommendations concerning stroke recognition, warning signs, risk factors, and early management from the World Health Organization and the American Heart Association/American Stroke Association (WHO, 2025). Stroke is recognized as a time-sensitive medical emergency, and current recommendations emphasize rapid identification of neurological symptoms and timely access to appropriate care. The initial questionnaire consisted of 15 multiple-choice items covering the definition of stroke, modifiable and non-modifiable risk factors, signs and symptoms, stroke recognition using the FAST approach (Face drooping, Arm weakness, Speech difficulty, Time to seek emergency care), the importance of the golden period, and appropriate early or prehospital management. Prior to data collection, validity and reliability testing were conducted. Of the initial 15 items, 12 met the validity criteria and were retained in the final questionnaire, whereas three items were excluded. Reliability testing demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.930.

The educational intervention consisted of a single 30-minute face-to-face health education session delivered by the researchers using a lecture method. A booklet was used as the primary educational medium during the session, while a leaflet containing key educational messages was provided to each respondent for independent review after the session. The educational content included the definition of stroke, modifiable and non-modifiable risk factors, recognition of stroke warning signs using the FAST approach, the importance of timely action during the golden period, and appropriate early management and referral when stroke was suspected. These components are consistent with current recommendations emphasizing rapid stroke recognition and timely prehospital evaluation and management (Prabhakaran, S., 2026).

Data collection consisted of a pretest, the educational intervention, and an immediate post-test. Before receiving health education, respondents completed the questionnaire to assess baseline knowledge regarding early stroke management. Following completion of the pretest, respondents participated in the 30-minute educational session. Immediately after the intervention, the same questionnaire was administered as a post-test to assess changes in knowledge.

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Data were analyzed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize respondent characteristics and the distribution of knowledge levels. Because pretest and post-test knowledge levels represented paired ordinal data, differences between measurements were analyzed using the Wilcoxon Signed-Rank Test. Statistical significance was set at $p < 0.05$.

This study was conducted in accordance with ethical principles for research involving human participants. Ethical approval was obtained from the Health Research Ethics Committee of STIKES Hang Tuah Surabaya, Indonesia (Approval No. **PE/72/II/2025/KEP/SHT**). Prior to participation, respondents received information regarding the study purpose, procedures, potential benefits, voluntary nature of participation, and their right to withdraw at any time without consequences. Written informed consent was obtained from all respondents before data collection. Participant confidentiality and anonymity were maintained throughout the study.

Results

Table 1. Characteristics of Respondents

The characteristic data indicate that the largest age group is 51–60 years (34.9%), followed by the 61–70 age group (25.6%). Regarding gender, the majority of respondents are female (53.5%). Most respondents have a primary school education (58.1%) and work as fishermen (58.1%). Furthermore, the majority of respondents (76.7%) have never previously received information about stroke.

Table 1. Characteristics of Respondents (n = 43)

Characteristics	Frequency (N)	Percentage (%)
Age (years)		
31–40	7	16.3
41–50	7	16.3
51–60	15	34.9
61–70	11	25.6
71–80	3	7.0
Sex		
Male	20	46.5
Female	23	53.5
Education		
Elementary school	25	58.1
Junior high school	17	39.5
Senior high school	1	2.3
Occupation		
Fisherman	25	58.1
Housewife	15	34.9
Entrepreneur	2	**4.7**
Previous information about stroke		
Never	33	76.7
Ever	10	23.3

Table 2 Distribution of Family Knowledge Before and After Education

The descriptive analysis showed an improvement in family knowledge following the health education intervention. The median knowledge score increased from 1.00 at pre-test to 3.00 at post-test. The mean score also increased from 1.09 (SD = 0.294) before the intervention to 2.65 (SD = 0.482) after the intervention. At pre-test, the knowledge scores ranged from 1 to 2, whereas at post-test, the scores ranged from 2 to 3. Consistent with these findings, the proportion of respondents with good knowledge increased from 0% before the intervention to 65.1% after the intervention, while the proportion with poor knowledge decreased from 90.7% to 0%.

Table 2. Family Knowledge Before and After Health Education (n = 43)

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Knowledge Score	Pre-test	Post-test
N	43	43
Mean	1.09	2.65
Median	1.00	3.00
SD	0.294	0.482
Minimum	1	2
Maximum	2	3

Table 3. Wilcoxon Signed-Rank Test of Family Knowledge Before and After Health Education

The Wilcoxon Signed-Rank Test demonstrated a statistically significant improvement in family knowledge following the health education intervention ($Z = -5.899$, $p < 0.001$). All 43 respondents showed positive changes in knowledge scores, with no negative ranks and no ties. These findings indicate that the provision of health education was associated with a significant improvement in family knowledge regarding early stroke management.

Comparison	Positive ranks	Negative ranks	Ties	Z	p-value
Post-test vs Pre-Test	43	0	0	-5.899	<0.001

Discussion

The present study demonstrated a significant improvement in family knowledge regarding early stroke management following a 30-minute health education intervention. Before the intervention, 90.7% of respondents had poor knowledge, 9.3% had moderate knowledge, and none had good knowledge. Following the intervention, 65.1% of respondents demonstrated good knowledge, while no respondents remained in the poor knowledge category. The median knowledge category increased from 1.00 at pre-test to 3.00 at post-test. The Wilcoxon Signed-Rank Test showed a statistically significant difference between pre-test and post-test knowledge ($Z = -5.899$, $p < 0.001$), with all 43 respondents demonstrating positive changes. These findings indicate that the structured health education provided in this study was associated with a substantial improvement in family knowledge regarding early stroke management. The improvement is clinically relevant from an educational perspective because adequate recognition of stroke warning signs and understanding of the need for rapid action constitute important components of community preparedness for stroke emergencies (Tan, J., Ramazanu, S., Liaw, S. Y., & Chua, 2022); Tsakpounidou et al., 2022)

The findings are consistent with growing international evidence demonstrating that structured stroke education can improve recognition of stroke symptoms and knowledge of appropriate responses. A systematic review and meta-analysis by (Tan, J., Ramazanu, S., Liaw, S. Y., & Chua, 2022) found that public stroke education campaigns significantly improved stroke symptom recognition (RR = 1.20, 95% CI: 1.07–1.36) and intention to call emergency medical services (RR = 1.19, 95% CI: 1.11–1.28). Similarly, the multinational FAST Heroes campaign demonstrated successful transfer of stroke-related knowledge to families. Among 4,202 parents participating in the program, recognition of three key stroke symptoms increased from 48% before the intervention to 83% afterward, while the proportion identifying the appropriate emergency response also improved substantially (Tsakpounidou et al., 2022). These findings reinforce the value of simple, memorable, and structured educational messages for strengthening stroke awareness among family and community members. Although the educational approaches and populations differed from the present study, the consistent improvement in stroke-related knowledge suggests that targeted educational interventions can address important gaps in public recognition of stroke.

The findings are also supported by studies conducted in Indonesia. (Parmin, S., Mustikasari, & Azzam, 2021) reported that peer education significantly improved knowledge

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among families of patients with stroke, with 76.5% of respondents in the intervention group demonstrating good knowledge after education and a statistically significant difference between groups (p = 0.015). (Rohmah, 2024). similarly found that education using a folding booklet improved knowledge among family caregivers of patients with stroke. Booklet-based education has also been reported to improve family knowledge regarding early stroke detection, further supporting the value of printed educational materials for communicating essential stroke information (IntanPutri,SitiRomadoni, 2023). In addition, (Huda, N., & Delita, 2019) demonstrated improved knowledge of early stroke detection following FAST-based health education in a community setting in Surabaya. These Indonesian findings are particularly relevant to the present study because they demonstrate that stroke education delivered through different approaches—including peer education, FAST-based education, and printed educational media—can strengthen stroke-related knowledge. Nevertheless, the populations in several of these studies consisted of caregivers or families of patients with stroke, whereas respondents in the present study were adult family/community members and were not specifically recruited as caregivers of diagnosed stroke patients. The present findings therefore extend the evidence to a broader community-based population.

Evidence from family- and community-oriented stroke education programs in other settings further supports the importance of disseminating stroke knowledge beyond patients themselves. A systematic review and meta-analysis by (Tshiswaka at al 2018, 2018) found that community stroke education delivered through children could successfully transfer stroke knowledge to parents, with correct responses increasing from 68.6% at baseline to 84.7% immediately after education and remaining at 84.5% during delayed assessment. The FAST Heroes program subsequently demonstrated similar intergenerational knowledge transfer across multiple countries, with substantial improvements in parents' recognition of stroke symptoms following participation in the program(Tsakpounidou et al., 2022). Furthermore, community-based educational strategies may have implications beyond knowledge alone. (Yuan, J., Li, M., Liu, Y., Xiong, X., Zhu, Z., Liu, F., Wang, Y., Hu, W., Lu, Z. K., Liu, R., & Zhao, 2022) reported that implementation of the multifaceted Stroke 1-2-0 community education campaign in China was associated with a reduction in median prehospital delay from 18.72 to 6.00 hours, an increase in arrival within three hours from 5.8% to 33.4%, and an increase in ambulance use from 3.2% to 30.6%. These findings illustrate the potential value of sustained community stroke education in promoting appropriate responses to stroke symptoms. However, the present study assessed knowledge rather than actual emergency behavior or prehospital delay; therefore, improvements in knowledge observed in this study should not be interpreted as evidence of improved healthcare-seeking behavior or reduced time to hospital arrival.

The substantial improvement observed in the present study may also be related to the characteristics of the respondents and the educational strategies used. Most respondents had an elementary school education (58.1%), and more than three-quarters (76.7%) had never previously received information about stroke. The combination of a face-to-face lecture with a booklet and leaflet provided opportunities for direct explanation while also allowing respondents to review key information after the educational session. Evidence from a Cochrane review indicates that active information provision may improve stroke-related knowledge, particularly when educational approaches provide opportunities for clarification, reinforcement, and active engagement(Crocker at al, 2021). Similar findings have been reported in Indonesia, where booklet-based education improved family knowledge regarding early stroke detection (Romadoni, 2023), while folding-booklet education increased stroke-related knowledge among family caregivers(Rohmah, 2024). The use of simple and memorable stroke recognition messages, particularly the FAST approach, may further facilitate recognition of warning signs. Community- and school-based stroke education programs using simple recognition messages have consistently demonstrated improvements in stroke knowledge among participants and their family members (Li et al., 2020); (van der Merwe at al, 2023). These findings support the

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use of structured, accessible, and reinforced educational messages when providing stroke education to community populations with limited previous exposure to stroke information.

Family members may play an important role in the early stroke care pathway because they may be present when symptoms occur and may participate in decisions regarding whether and how quickly healthcare is sought. Increasing family knowledge may therefore represent an important first step in strengthening the community component of stroke care. Family- and caregiver-oriented interventions have been recognized as important components of stroke management, although their content, delivery methods, and outcomes vary across studies(Bakas et al., 2022); (Mou, H., Wong, M. S., & Chien, 2021) The WHO framework for acute stroke care emphasizes a continuum extending from community awareness and prehospital care to acute hospital treatment, rehabilitation, and long-term management (World Health Organization., 2025) This is particularly relevant in Indonesia, where limited recognition of stroke symptoms, educational and socioeconomic factors, cultural beliefs, transportation barriers, and low utilization of emergency medical services have been identified as factors associated with prehospital delay(Wiyarta et al., 2025). International evidence also demonstrates that community stroke education can contribute to improvements in stroke recognition and intended emergency responses (Tan, J., Ramazanu, S., Liaw, S. Y., 2022); (Yuan, J., Li, M., Liu, Y., Xiong, X., Zhu, Z., Liu, F., Wang, Y., Hu, W., Lu, Z. K., Liu, R., & Zhao, 2022). Nevertheless, because the present study measured knowledge rather than actual behavior, its findings should not be interpreted as evidence that the intervention directly reduced prehospital delay or improved emergency healthcare utilization.

The findings have practical implications for community nursing and primary healthcare. Community nurses are strategically positioned to provide brief and structured stroke education as part of health promotion activities, particularly for populations with limited previous exposure to stroke information. Educational messages can emphasize recognition of warning signs, use of simple recognition tools such as FAST, the time-sensitive nature of stroke, and appropriate actions when stroke is suspected. Evidence from international studies suggests that community- and family-oriented stroke education can improve stroke knowledge and awareness across different populations and educational approaches(Hino, T., 2018); (Proios, H., Baskini, M., Keramydas, C., 2022). Structured educational approaches have also demonstrated benefits for health-related awareness in other community populations, supporting the broader role of nursing education in health promotion(Agustini, N. K. T., & Wahyuningsih, 2024).This is consistent with the broader public health emphasis on community awareness as an integral component of a time-sensitive stroke care system(World Health Organization., 2025). Considering the continuing global burden of stroke, strengthening community knowledge remains relevant to efforts aimed at promoting earlier recognition and appropriate responses to suspected stroke(Feigin, V. L., Brainin, M., Norrving, B., Martins, S. O., Pandian, J., Lindsay, P., Grupper, M. F., & Rautalin, 2025) .

Despite the significant improvement observed, several limitations should be considered. First, the study employed a pre-experimental one-group pretest–posttest design without a control group; therefore, the observed improvement cannot be attributed exclusively to the educational intervention because testing effects and other external influences cannot be completely excluded. Second, the sample consisted of only 43 respondents recruited using purposive sampling from a single community, which limits the generalizability of the findings. Third, the post-test was administered immediately after the intervention, preventing assessment of long-term knowledge retention. This is important because previous stroke education studies have incorporated delayed assessments to examine whether improvements in knowledge are sustained over time(Tshiswaka at al 2018, 2018). Fourth, although the researcher-developed questionnaire demonstrated excellent internal consistency (Cronbach's $\alpha = 0.930$) and 12 of the initial 15 items met the validity criteria, the instrument has not been established as a standardized measure for broader populations. Finally, the study assessed knowledge rather than

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actual recognition behavior, emergency decision-making, prehospital response, or time to healthcare access. Future studies should employ controlled or randomized designs, larger and more diverse samples, and longer follow-up periods. Behavioral outcomes should also be evaluated because previous community interventions indicate that stroke education may influence not only knowledge but also emergency response and healthcare-seeking behavior(Tan, J., Ramazanu, S., Liaw, S. Y., & Chua, 2022).

Conclusion

This study demonstrated that a 30-minute health education intervention delivered through a face-to-face lecture supported by a booklet and leaflet was associated with a significant improvement in family knowledge regarding early stroke management. Following the intervention, respondents demonstrated better knowledge of early stroke management, with a marked shift from poor to moderate and good knowledge categories. These findings suggest that brief, structured, and accessible health education may be a useful community nursing strategy for strengthening family knowledge of stroke warning signs and appropriate early responses.

Further research should involve larger and more diverse samples from multiple communities and employ controlled or randomized study designs to provide stronger evidence regarding the effectiveness of stroke education. Longer follow-up periods are needed to determine whether improvements in knowledge are sustained over time. Future studies should also evaluate behavioral outcomes, including recognition of stroke warning signs, decision-making, emergency response, and time to healthcare access, to determine whether improved family knowledge translates into timely and appropriate action when stroke is suspected.

Ethics approval and consent to participate

Ethical approval was obtained from the **Ethics Committee of STIKES Hang Tuah Surabaya** (Approval No. **PE/72/II/2025/KEP/SHT**). Written informed consent was obtained from all participants prior to data collection. Participation was voluntary, and participants were informed of their right to withdraw at any time. Confidentiality and anonymity of participants' information were maintained throughout the study.

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