

Empowering Family Caregivers in Home-Based Care for Post-Stroke Patients with Hemiparesis and Diabetes Mellitus

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ARTICLE INFORMATION

Article history:

Received: 2026-04-20

Revised : 2026-04-22

Accepted: 2026-04-30

Keywords:

Caregivers; Diabetes Mellitus; Hemiparesis; Home Care Services; Stroke

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How to cite:

Prastyo, P. A. T. (2026). Empowering family caregivers in home-based care for post-stroke patients with hemiparesis and diabetes mellitus. *GENCARE: Journal of Community Service in Health*, 1(1). <https://doi.org/10.66763/gencare.v1i1.42>

ABSTRACT

Background: Post-stroke patients with hemiparesis commonly experience impaired mobility, dependence in activities of daily living, and complications that increase the need for family involvement in home-based care. Coexisting diabetes mellitus adds demands for continuous monitoring, medication management, and long-term lifestyle care. Limited caregiver knowledge and practical skills may reduce readiness to provide safe care.

Objectives: This community service program aimed to improve family caregivers' knowledge and skills in caring for post-stroke patients with hemiparesis and diabetes mellitus at home.

Methods: Thirty family caregivers participated in health education, demonstrations, and guided practice covering safe mobilization and range-of-motion exercises, fall and pressure injury prevention, nutritional management, blood glucose monitoring, medication adherence, and recognition of recurrent-stroke warning signs. Outcomes were evaluated using pre-test and post-test knowledge assessments and a caregiver skills checklist.

Results: The mean knowledge score increased from 56.7 before the program to 84.3 after the program. The proportion of caregivers categorized as skilled increased from 46.7% to 86.7%. Participants also demonstrated better performance in safe mobilization, range-of-motion exercises, patient-condition monitoring, and recognition of warning signs requiring medical attention.

Conclusions: Family-centered education combined with practical skills training was followed by improved caregiver knowledge and caregiving skills. Continued education and follow-up support are recommended to strengthen safe home care, family independence, and continuity of post-stroke care.



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Introduction

Stroke remains a major global public health problem and an important cause of long-term disability. The World Stroke Organization reported that stroke remains the second leading cause of death and the third leading cause of death and disability combined worldwide. Between 1990 and 2021, the absolute global burden increased substantially, including increases in incident strokes, prevalent cases, deaths, and disability-adjusted life-years. The burden is particularly concentrated in low- and lower-middle-income countries, emphasizing the importance of accessible rehabilitation and continuity-of-care strategies beyond hospital settings (Feigin et al., 2025).

Stroke also represents a substantial health burden in Indonesia. The 2023 Indonesian Health Survey reported a physician-diagnosed stroke prevalence of approximately 8.3 per 1,000 people aged 15 years or older. Current Indonesian national stroke guidelines emphasize an integrated continuum of care that includes acute treatment, rehabilitation, secondary prevention, and multidisciplinary patient-centered management (Ministry of Health of the Republic of Indonesia, 2026).

Survivors frequently experience motor impairment, muscle weakness, impaired balance, reduced mobility, and limitations in activities of daily living. Hemiparesis may restrict the ability to reposition in bed, transfer, stand, walk, maintain personal hygiene, and perform other self-care activities. Consequently, rehabilitation should extend beyond the acute hospital phase and involve coordinated participation by patients, nurses, rehabilitation professionals, and family caregivers (Winstein et al., 2016). Home-based rehabilitation can provide an important continuation of functional training, particularly when caregivers participate in exercises and daily activities (Chi et al., 2020).

The transition from hospital to home is particularly challenging because responsibility for many daily care activities moves from healthcare professionals to patients and informal caregivers. Family members may suddenly be required to assist with mobility, personal care, medication administration, symptom observation, nutrition, and rehabilitation exercises despite having limited previous caregiving experience. Reviews of stroke transition experiences consistently identify the need for relevant information, caregiver involvement before discharge, individualized preparation, and continuing professional support (Chen et al., 2021; Damaiyanti et al., 2023).

The caregiving burden becomes more complex when stroke occurs together with diabetes mellitus. Diabetes is an important vascular risk factor, and secondary stroke prevention requires comprehensive management of modifiable risks, including blood pressure, glucose, lipids, lifestyle behaviors, and adherence to prescribed medication (Kleindorfer et al., 2021). Diabetes management may additionally require families to understand blood glucose monitoring, dietary management, medication schedules, and recognition of abnormal conditions. Contemporary diabetes recommendations similarly emphasize comprehensive cardiovascular risk reduction among people with established vascular disease (American Diabetes Association Professional Practice Committee, 2024).

Medication management is another important component of long-term care. Post-stroke patients commonly use multiple medicines for secondary prevention and management of comorbidities, making adherence and medication self-management potentially difficult when neurological or functional deficits are present (Cadel et al., 2023). Higher adherence to secondary prevention medication has been associated with improved survival after stroke or transient ischemic attack, supporting the need for families to understand medication schedules and the importance of continued treatment (Dalli et al., 2021).

Physical safety is equally important. Mobility limitations and impaired balance may increase the risk of falls after stroke, while prolonged immobility may contribute to skin problems, contracture, and other complications. Exercise-based approaches form an important component of fall-prevention and rehabilitation strategies, although intervention selection should be individualized according to functional ability and safety (Denissen et al., 2019). Caregiver-mediated exercise programs have also shown beneficial effects on basic activities of daily living, indicating that

appropriately trained family members can contribute meaningfully to continuing rehabilitation (Choo et al., 2022).

Caregiver education therefore should extend beyond verbal information. Systematic reviews suggest that individualized education, caregiver support, problem-solving approaches, multimodal interventions, and practical caregiver training may improve caregiver participation and competence (Mack & Hildebrand, 2023; Mou et al., 2021). Structured psychoeducation has also been associated with improved caregiving competence and problem-solving abilities among family caregivers of stroke survivors (Cheng et al., 2018). More recent evidence using demonstration-based and teach-back approaches further supports active learning when caregivers must master practical home-care skills (He et al., 2025).

Based on these needs, a family-centered community service program was developed to combine health education with demonstration and guided practice. The program addressed safe mobilization, range-of-motion exercises, prevention of falls and pressure injuries, nutritional and diabetes management, blood glucose monitoring, medication adherence, and recognition of recurrent-stroke warning signs. The program aimed to improve the knowledge and caregiving skills of family caregivers providing home-based care for post-stroke patients with hemiparesis and diabetes mellitus.

Methods

Program Design/Approach

This community service activity used a family-centered educational and skills-training approach. The program combined health education with demonstration and guided practice because caregivers require both cognitive understanding and practical competence when assisting post-stroke patients at home. Educational components focused on understanding stroke-related problems, diabetes management, complication prevention, medication adherence, and recognition of warning signs, whereas practical components emphasized safe mobilization, positioning, range-of-motion exercises, and patient monitoring.

The approach was designed around active caregiver participation. Rather than relying only on one-way information delivery, practical caregiving procedures were demonstrated and subsequently practiced by participants with guidance and corrective feedback. This approach is consistent with evidence indicating that caregiver-mediated exercise, structured caregiver education, and multimodal support can strengthen caregiving competence and support continued rehabilitation after stroke (Choo et al., 2022; Mack & Hildebrand, 2023).

Community Partner and Target Population

The target population consisted of 30 family caregivers of post-stroke patients involved in or preparing to undertake home-based caregiving responsibilities. The program focused particularly on caregiving needs associated with hemiparesis, mobility limitation, dependence in daily activities, prevention of immobility-related complications, and concurrent diabetes mellitus.

The needs assessment focused on the challenges faced by families when responsibility for care shifts from healthcare professionals to the home environment. Priority areas included safe patient movement, maintenance of joint mobility, prevention of falls and pressure injuries, nutrition, blood glucose monitoring, medication adherence, observation of changes in the patient's condition, and recognition of recurrent-stroke warning signs.

Community Service Intervention/Activities

The community service program was organized into five interconnected stages. During Stage 1, Preparation and Needs Assessment, caregiving problems related to post-stroke mobility limitation, hemiparesis, dependence in daily activities, diabetes management, and home safety were identified and translated into learning priorities.

During Stage 2, Coordination and Program Planning, the educational content and practical training sequence were organized around the identified caregiver needs. The program was structured to integrate knowledge-oriented education with skills-oriented demonstration and practice.

During Stage 3, Implementation of the Intervention, caregivers received education and practical training covering ten core areas: basic understanding of post-stroke conditions and hemiparesis; safe positioning and mobilization; range-of-motion exercises; fall prevention; pressure injury prevention; nutritional management; blood glucose monitoring; medication adherence; monitoring of the patient's condition at home; and recognition of warning signs suggestive of recurrent stroke. For practical skills, participants observed demonstrations and subsequently performed guided practice with feedback and correction. Recognition of sudden balance disturbance, visual change, facial asymmetry, arm weakness, and speech difficulty was emphasized as requiring urgent medical evaluation because stroke is a time-sensitive medical emergency.

During Stage 4, Monitoring and Evaluation, participant knowledge was evaluated before and after the program using a knowledge assessment. Caregiving ability was evaluated using a caregiver skills checklist before and after training. Practical observations concentrated on caregivers' ability to assist with safe mobilization, perform range-of-motion exercises, monitor the patient's condition, and identify warning signs requiring medical attention.

During Stage 5, Follow-up and Sustainability, the program emphasized the importance of repeated caregiver practice, continued education, reinforcement during healthcare encounters, and ongoing communication between families and healthcare professionals. These strategies are particularly relevant because transitional-care reviews have shown that continued education, follow-up, coaching, and caregiver involvement can support the transition from hospital-based treatment to home care (O'Callaghan et al., 2022; Veronese et al., 2025).

Table 1. Components of the Family Caregiver Education and Skills-Training Program

Program Component	Main Content	Educational Strategy	Expected Caregiver Competency
Understanding post-stroke conditions	Stroke, hemiparesis, functional limitations, complications	Health education and discussion	Understand the patient's condition and home-care needs
Safe positioning and mobilization	Position changes, movement assistance, transfer safety	Demonstration and guided practice	Assist mobility without unnecessary injury
Range-of-motion exercise	Active and assisted/passive movement as appropriate	Demonstration and return practice	Perform basic ROM safely
Fall prevention	Environmental and mobility-related risks	Education and practical guidance	Identify and reduce fall risks
Pressure injury prevention	Positioning, skin observation, pressure reduction	Education and demonstration	Prevent prolonged pressure and identify early skin changes
Nutritional management	Appropriate diet and diabetes-related dietary considerations	Health education	Support appropriate daily nutritional management
Blood glucose monitoring	Importance and basic monitoring principles	Education and guided practice	Support glucose monitoring according to the patient's care plan
Medication adherence	Medication schedules and continuity of treatment	Health education	Support consistent use of prescribed medication
Patient-condition monitoring	Observation of mobility, consciousness, general condition, and relevant changes	Education and guided observation	Detect important changes in the patient's condition
Recurrent-stroke warning signs	Balance/vision changes, facial droop, arm weakness, speech difficulty, urgency of care	Education and scenario discussion	Recognize warning signs and seek urgent medical assistance

Instruments and Program Evaluation

Program evaluation addressed two primary domains: caregiver knowledge and caregiving skills. Knowledge was assessed before and after the educational program. The program dataset provided mean knowledge scores of 56.7 at pre-test and 84.3 at post-test.

Caregiving skills were assessed using a caregiver skills checklist before and after the intervention. The proportion of participants categorized as skilled was 46.7% before the program and 86.7% after the program. Practical competencies evaluated during the program included safe mobilization, range-of-motion exercises, patient-condition monitoring, and recognition of warning signs requiring medical attention. No inferential statistical test, effect size, or instrument validity coefficient was used in the present report because these data were not available in the program dataset.

Data Collection

Data collection followed a pre-program assessment, intervention, and post-program assessment sequence. Participants first completed the knowledge assessment and were evaluated using the caregiver skills checklist. They subsequently participated in the educational and practical training activities. After completion of the program, knowledge and caregiving skills were reassessed using the corresponding post-program measurements.

Data Analysis

Program outcomes were analyzed descriptively. Mean scores were used to summarize caregiver knowledge before and after the program, whereas proportions were used to describe participants categorized as skilled. Absolute pre-post changes were calculated to assist interpretation. No inferential statistical testing was conducted; therefore, the findings are reported as descriptive program outcomes rather than statistically significant intervention effects.

Ethical Considerations

The manuscript reports program outcomes in aggregate and does not disclose patient or caregiver identities. No individual clinical identifier is presented. Confirmation of the formal participant-consent procedure, institutional/community permission, and ethics-review status should be completed in the journal submission documentation.

Results

Implementation of the Community Service Program

Thirty family caregivers participated in the family-centered education and skills-training program. Training combined health education, demonstration, and guided practice to address the practical problems commonly encountered when caring for post-stroke patients with hemiparesis and diabetes mellitus at home. The content integrated rehabilitation-related care with complication prevention and chronic-disease monitoring rather than addressing individual caregiving tasks separately.

Participants practiced safe approaches to mobilization and range-of-motion exercises and were trained to observe the patient's general condition. The program additionally addressed prevention of falls and pressure injuries, nutritional and blood glucose management, medication adherence, and recognition of neurological warning signs.

Changes in Caregiver Knowledge

The mean knowledge score increased from 56.7 before the program to 84.3 after the program, representing an absolute increase of 27.6 points. The descriptive change indicates greater participant understanding of home-based post-stroke care after participation in the educational program.

Table 2. Knowledge Scores Before and After the Program

Indicator	Pre-program	Post-program	Absolute Change
Mean knowledge score	56.7	84.3	+27.6

Changes in Caregiving Skills

Caregiving skills also improved descriptively after the program. Before training, 46.7% of participants were categorized as skilled. Following education, demonstration, and guided practice, this proportion increased to 86.7%, representing an increase of 40.0 percentage points.

Table 3. Caregiver Skills Before and After the Program

Indicator	Before Program	After Program	Absolute Change
Caregivers categorized as skilled	46.7%	86.7%	+40.0 percentage points

Observed Practical Competencies

Following the program, participants demonstrated improved performance in safe mobilization and range-of-motion exercises. Caregivers also showed improved ability to monitor the patient's condition and recognize warning signs requiring medical attention. These practical outcomes complement the improvement in knowledge and suggest that combining information delivery with skills practice may help caregivers translate conceptual understanding into caregiving actions.

Discussion

The community service program was followed by a substantial descriptive increase in caregiver knowledge, from a mean score of 56.7 to 84.3. This finding is relevant because families frequently assume complex responsibilities during the transition from hospital to home despite variable preparation for caregiving. Reviews of post-stroke transitional care indicate that caregivers need timely, relevant, and individualized information as well as involvement in care before assuming responsibility at home (Chen et al., 2021; Damaiyanti et al., 2023).

The improvement in knowledge may be explained partly by the structured and clinically focused nature of the education. Rather than presenting stroke as a single disease concept, the program linked the patient's functional problems to concrete caregiving responsibilities, including mobility, complication prevention, diabetes management, medication adherence, patient monitoring, and emergency recognition. Systematic evidence suggests that education combined with caregiver support and problem-solving is more useful than generic information alone for many stroke caregivers (Mack & Hildebrand, 2023). Dyadic psychoeducational interventions similarly recognize stroke survivors and caregivers as active partners in long-term disease management (Mou et al., 2021; Zhang et al., 2023).

A second important outcome was the increase in caregivers categorized as skilled from 46.7% to 86.7%. The distinction between knowledge and practical skill is important in home care. Knowing that a patient requires mobilization does not necessarily mean that the caregiver can assist movement safely. Demonstration, supervised practice, feedback, and repetition provide opportunities for caregivers to transform verbal knowledge into psychomotor competence. A randomized trial of structured psychoeducation demonstrated improvements in caregiving competence among family caregivers of stroke survivors, while more recent video and teach-back training also improved caregiver knowledge and caregiving skills (Cheng et al., 2018; He et al., 2025).

The training in safe mobilization and range-of-motion exercise is particularly relevant for post-stroke patients with hemiparesis. Reduced motor control and mobility can lead to dependence in transfers, ambulation, and activities of daily living, making family assistance central to everyday rehabilitation. Home-based rehabilitation has demonstrated beneficial effects on physical functioning, and caregiver involvement may strengthen continuity of exercise outside formal rehabilitation sessions (Chi et al., 2020). A meta-analysis of caregiver-mediated exercise interventions also found beneficial effects on basic activities of daily living, supporting the feasibility of involving trained caregivers in rehabilitation activities (Choo et al., 2022).

Fall and pressure injury prevention were incorporated because impaired strength, balance, sensation, and mobility can expose stroke survivors to preventable complications. Falls are common after stroke, and exercise-based approaches constitute an important element of prevention even though the certainty of evidence varies between intervention types (Denissen et al., 2019). Education for families should therefore emphasize safe assistance, environmental awareness, appropriate positioning, and observation of skin condition rather than encouraging unsupervised activities beyond the patient's functional capacity.

The inclusion of diabetes management broadened the program beyond physical rehabilitation. Diabetes represents an important vascular risk factor in stroke prevention, and risk reduction after

stroke requires attention to metabolic and cardiovascular conditions alongside lifestyle behaviors and medication adherence. AHA/ASA secondary prevention guidance highlights diabetes, hypertension, lipids, physical activity, diet, and medication-related behavior as important components of recurrent-stroke prevention (Kleindorfer et al., 2021). Diabetes standards similarly emphasize comprehensive cardiovascular risk management for people with diabetes and established vascular disease (American Diabetes Association Professional Practice Committee, 2024).

Medication adherence was therefore a relevant educational component. Stroke survivors may face difficulties managing complex medication regimens, particularly when disability or comorbidity is present. A scoping review found that post-stroke medication self-management interventions frequently address secondary prevention, risk-factor control, and lifestyle modification, but opportunities remain to strengthen community-based medication support (Cadel et al., 2023). Remote and behavioral support interventions have also shown potential to improve medication adherence after stroke (Choi et al., 2023).

The observed improvement in participants' recognition of warning signs is clinically important. Secondary stroke prevention is not limited to controlling long-term risk factors; families also need to recognize sudden neurological changes and understand that recurrent stroke requires urgent medical evaluation. AHA/ASA educational resources emphasize sudden balance or vision disturbance, facial drooping, arm weakness, and speech difficulty as warning signs requiring immediate emergency response. This knowledge is particularly valuable when the family is the first observer of a change in the home environment.

The findings also reinforce the broader value of family-centered transitional care. Contemporary systematic reviews describe hospital-to-home transition as a vulnerable period during which inadequate caregiver preparation may increase difficulty and errors in care. Educational interventions, home follow-up, health coaching, and structured transition support can contribute to improved self-efficacy, physical function, activities of daily living, or caregiver outcomes depending on the program and population (O'Callaghan et al., 2022; Veronese et al., 2025).

The present program should nevertheless be interpreted as a community service evaluation rather than a controlled effectiveness study. The pre–post changes describe what occurred among participating caregivers but do not establish that the intervention alone caused the observed improvement. The absence of a comparison group, inferential testing, and longer-term measurement means that the findings are most appropriately considered evidence of program feasibility and short-term educational benefit rather than proof of clinical effectiveness.

Implications, Sustainability, and Limitations

The program has practical implications for nursing and continuity of care. Caregiver education for stroke should not be restricted to discharge instructions or printed information. Nurses can assess the specific tasks that families will be expected to undertake, demonstrate those tasks, observe caregivers performing them, provide corrective feedback, and verify that caregivers can identify situations requiring professional assistance. This approach is consistent with evidence emphasizing caregiver preparation, individualized education, and support during transition to home care.

Sustainability may be strengthened by incorporating caregiver training into routine discharge preparation and subsequent primary-care or community-nursing follow-up. Repeated reinforcement, refresher education, and structured communication with healthcare professionals may help caregivers maintain confidence and correct practical techniques. Where feasible, remote communication can supplement face-to-face support, as technology-assisted interventions have shown potential to strengthen medication adherence and caregiver support after stroke (Choi et al., 2023).

Several limitations should be acknowledged. The program used a descriptive pre-test and post-test evaluation without a control group or inferential statistical analysis. The available dataset did not include detailed caregiver demographic characteristics, preventing subgroup analysis. The evaluation focused on knowledge and skills shortly after the educational activity; therefore, long-

term retention of skills was not established. Patient-level clinical outcomes, including functional recovery, recurrent stroke, glycemic control, falls, pressure injuries, or hospital readmission, were not evaluated as program outcomes. These limitations restrict causal interpretation and generalization but do not diminish the value of the program as an initial family-centered educational initiative.

Relevance for Practice

Nurses caring for post-stroke patients should consider caregiver competence as part of the transition-to-home assessment. Before home care begins, families can be prepared through a structured sequence of education, demonstration, supervised return practice, and competency evaluation covering patient mobility, basic rehabilitation, safety, medication adherence, chronic-disease monitoring, and stroke-warning-sign recognition. Healthcare institutions may incorporate this approach into discharge planning and coordinate reinforcement through primary-care or community-based nursing services. Such preparation can help move caregiver education from passive information delivery toward practical readiness for the responsibilities families face at home.

Conclusion

The family-centered community service program was followed by improved knowledge and caregiving skills among family caregivers of post-stroke patients with hemiparesis and diabetes mellitus. Combining health education with demonstration and guided practice enabled the program to address both caregivers' understanding and practical home-care competencies, particularly safe mobilization, range-of-motion exercise, patient monitoring, and recognition of warning signs. The findings support the inclusion of structured caregiver preparation within the transition from hospital-based stroke care to home care. Continued education and follow-up are recommended to maintain caregiving competence, support family independence, and promote safer continuity of care.

Acknowledgment

The author would like to express sincere gratitude to all family caregivers who voluntarily participated in the community service program and actively engaged in the educational and skills-training activities. Appreciation is also extended to the healthcare professionals and community partners who provided support and cooperation during the implementation of the program. Special thanks are addressed to the academic supervisors and the Nursing Study Program, Faculty of Health, Universitas Nurul Jadid, for their guidance, constructive feedback, and academic support throughout the preparation and completion of this community service article.

Author Contribution

Panji Anom Tri Prastyo contributed to the conceptualization of the community service program, needs assessment, program planning, implementation of health education and caregiver skills training, data collection, program evaluation, literature review, data interpretation, and preparation of the original manuscript

Funding

This research received no external funding.

Declaration of Conflicting Interest

The authors declare no conflict of interest related to the implementation of this community service program or the publication of this manuscript.

Declaration of Use of AI in Scientific Writing

The authors declare that generative AI and AI-assisted technologies were used solely to support language editing, grammatical refinement, and improvement of the clarity and readability of the manuscript. The authors reviewed, verified, and revised all AI-assisted content and remain fully responsible for the accuracy, integrity, interpretation, and final content of the manuscript.

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