

MULTIDISCIPLINARY APPROACH FOR LONG TREATMENT OF STROKE MANAGEMENT : AN INSIGHT TO THE ROLES OF FAMILY PHYSICIAN

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ABSTRACT

Introduction: Stroke has a serious impact on society in the form of severe disability, death, and significant economic, social, and emotional consequences. Doctors in primary care and family-centered care as the first line in the health system have a role in the prevention, treatment, and long-term care of stroke cases. A comprehensive search was conducted using biomedical databases to identify relevant research regarding the role of primary care physicians in long-term stroke management particularly in family medicine practice. The keywords used in our search through the database were “Family Medicine” or “Family Physician” and “Stroke Management” or “Long Term Stroke Management”. Family-centered approach to stroke management which includes prevention, early intervention, managing risk factors, rehabilitation, and long-term care. Through this approach, risk factors for stroke in the family can be identified, provide education about stroke symptoms, and contribute to creating an environment that supports optimal patient recovery. By involving a family-centered care in the treatment plan, the quality of life of post-stroke patients can be improved, thereby reducing the risk of recurrence.. In the long-term care of post-stroke patients, family doctors are responsible for providing spasticity management, preventing subsequent strokes and managing early complications, educating families and caregivers, and managing the patient's quality of life. Family physicians play a central role in long-term stroke management to ensure holistic and sustainable care for stroke patients in the community.

Keywords: *Family Medicine, Family Physician, Stroke Management, Long Term Stroke Management*

1. INTRODUCTION

Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH). In general, stroke is an acute symptoms that arise due to nerve disorders in the brain, spinal cord, and/or retina, either partially or completely, that last at least 24 hours or result in death due to blood vessel problems. As previously mentioned, stroke can be caused by acute focal injury to the CNS from vascular causes, including cerebral infarction, ICH, and SAH. The term ischemic stroke is a stroke caused by blockage of blood vessels

which limits the blood supply to the brain. On the other hand, hemorrhagic stroke is caused by a rupture of blood vessels which causes blood to enter the intracranial cavity.^{1,2,3,4} Meanwhile, based on the Decree of the Minister of Health of the Republic of Indonesia No. HK.01.07/MENKES/394/2019, stroke is defined as an acute symptom that arises due to nerve disorders in the brain, spinal cord, and/or retina, either in part or in whole, which lasts at least 24 hours or result in death due to blood vessel problems.⁵

Stroke is a cause of severe disability and death and has a significant negative with serious economic, social, and emotional consequences. Globally, the incidence of stroke was reported to have reached 12.2

million in 2019, with a prevalence of 101 million and deaths due to stroke of around 6.55 million. From 1990 to 2019, the absolute number of stroke events, prevalence, and deaths from stroke increased by 70%, 85%, and 43%, respectively.⁶ Stroke was the second highest cause of death (11.6% of total deaths) and the third most common cause of death and disability (5.7% of total disability-adjusted life-years [DALYs]).^{7,8} According to the Indonesian Ministry of Health (2017), it was stated that of the 10 main causes of death based on the Sample Registration System (SRS), including Non-Communicable Diseases (PTM), namely stroke in the first place, followed by coronary heart disease and diabetes mellitus.⁹ The highest prevalence of stroke in Indonesia is in East Kalimantan based on diagnosis in residents aged > 15 years, namely (14.7%), followed by the province of DI Yogyakarta (14.5%), North Sulawesi (14%) and South Kalimantan (12.7%) ranks 6th out of 34 provinces. The prevalence of stroke in Indonesia is 12.1% per 1,000 population, which is an increase compared to the 2013 Riskesdas of 8.3%. Stroke is the main cause of death in almost all hospitals in Indonesia. The incidence of stroke has increased sharply in Indonesia by 14.5%,¹⁰. In fact, Indonesia has been reported to have the highest incidence of stroke in Asia.

The best method to control the burden of stroke and to meet the global goal of a 2% annual reduction in stroke mortality is primary prevention through early detection of stroke risk factors.¹¹ Stroke risk factors are usually divided into non-modifiable risk factors (age, sex, ethnicity, low birth weight, and congenital diseases) and modifiable risk factors (hypertension, diabetes mellitus, heart disease, smoking, dyslipidemia, obesity, metabolic syndrome, and use of oral medications), oral contraceptives, etc.² The newest risk factors of stroke include inflammatory disorders, infections, pollution, and atrial heart disorders independent of atrial fibrillation.

Single-gene disorders can cause rare inherited disorders in which stroke is the primary manifestation. Recent research also suggests that common and rare genetic polymorphisms may influence more common causes of stroke, both due to other risk factors and specific stroke mechanisms, such as atrial fibrillation. Genetic factors, especially those interacting with the environment, maybe more modifiable than previously recognized.^{6,12}

The role of primary care doctors and family-centered care cover prevention with modification of these risk factors to the process of recovery, reintegration, and health maintenance that occurs over many years. First-line health services, including family family-centered doctors, provide this long-term care. In addition, family-centered care can collaborate with different specialist and subspecialist treatments that may be needed.¹³

2. METHOD

To review the role of primary care physicians in long-term stroke management specifically in family medicine practice, a comprehensive search was initiated using biomedical databases: PubMed, DOAJ, SCOPUS, GARUDA, AND Google Scholar to identify all relevant studies. The search starts from July 1, 2019 to July 30, 2024, with the keywords used in the database search being "Family Medicine" or "Family Physician" and "Stroke Management" or "Long Term Stroke Management". The following keywords were used for the article title, abstract, and keywords for the automatic publication search and all types of articles whether written in English or Indonesian translation were included in the search. Additionally, to help focus on related issues, data were filtered based on text availability and publication date using initial checklist filters "free full text" and publication date "5 years". Additionally, all identified literature was further evaluated based on its relevance and applicability to the objectives of this research. No software was used in

data extraction, which was based on a standard format that included title, author's name, aim, summary, and research results.

3. RESULTS

Stroke is a neurological disorder that suddenly occurs due to infarction in the central nervous system (CNS) involving the death of the brain, spinal cord, or retina cells due to ischemia. Strokes are classified based on the underlying pathological process and vascular distribution into ischemic, hemorrhagic, and unspecified strokes.¹⁴ In stroke management, the role of family-centers doctors is no less important than comprehensive management in hospitals. These roles are outlined through prevention strategies with assessment and management of risk factors, early recognition of signs and symptoms of stroke as well as early pre-hospital treatment and comprehensive long-term post-stroke care.

3.1 Risk Factor Assessment and Management Stroke

Currently, several stroke risk assessment tools have been introduced. However, the complexity of the

interaction of risk factors and their effects influenced by age, gender, race/ethnicity, and geography has not been fully covered in existing global risk assessment tools. Although many risk assessment tools exist, the validity and suitability of some models in certain age groups or racial/ethnic groups have not been well tested.^{15,16,17}

However, recent guidelines from the AHA/ASA emphasize the importance of including stroke and coronary heart disease events as outcomes in risk assessment tools for primary prevention. The use of risk assessment tools such as stroke risk assessment makes sense because these tools can help identify individuals who may benefit from therapeutic intervention and who may not be treated based on a single risk factor. These tools are useful for alerting physicians and patients to possible risks, but treatment decision-making on outcomes needs to be considered in the context of the patient's overall risk profile. The following are stroke risk assessment tools developed by AHA/ASA to assess stroke risk.¹⁸

Table 1. Stroke Risk Assessment (Adapted from AHA/ASA)

Risk Factor	High Risk	Low Risk
Is your blood pressure more than 120/80 mm/Hg?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Have you ever been diagnosed with atrial fibrillation	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Is your blood sugar more than 100 mg/dL?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Is your body mass index greater than 25 kg/m ²	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Is your diet high in saturated fat, trans fat, sugary drinks, salt, excess calories**?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Is your total blood cholesterol more than 160 mg/dL?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Have you ever been diagnosed with diabetes mellitus?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Do you do less than 150 minutes of moderate to vigorous intensity activity per week?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____
Do you have a personal or family history of stroke, TIA or heart attack?	<input type="checkbox"/> Yes or unknown _____	<input type="checkbox"/> No _____

Total Score

In addition to risk assessment, management of modifiable risk factors is important in the management of stroke prevention and prevention of recurrent stroke. Lifestyle modifications include changes in physical activity, diet, weight control, and stopping smoking. Physical activity is currently classified using METs, and an inverse lifetime association between physical exercise and stroke is generally accepted. Moderate to vigorous intensity exercise for at least 40 minutes per day, 3 to 4 days per week, is recommended.

Diet plays a significant role in various diets such as the Mediterranean, Dietary Approaches to Stop Hypertension (DASH), AHA, and US Department of Agriculture (USDA) diets promoting plant-based nutrition, reduced saturated fat, increased fruit and vegetables, and reduction of salt intake. Adherence to such a diet can reduce the risk of stroke.^{19,20,21} The Mediterranean diet is strongly

associated with a reduced incidence of stroke.²² Additionally, smoking cessation is highly recommended in reducing the risk of stroke, and interventions involving counseling and behavioral support are recommended.²

3.2 Recognition of Stroke Symptoms and Initial Treatment

In primary health care, recognition of stroke symptoms is essential to identify and respond promptly to patients who may be experiencing a stroke. Stroke symptoms can vary, but there are several signs that health workers need to pay special attention to. One method used to quickly recognize stroke symptoms is the "FAST" method, which stands for Face, Arms, Speech, and Time.

This method helps identify signs of stroke and encourages a rapid response from individuals who may experience or see someone experiencing stroke symptoms.²³

Table 2. FAST (adapted from AHA/ASA)

Sign	Initial Symptoms
<i>Face Drooping</i>	The face looks symmetrical, one side of the mouth is pulled down and the curve between the nose and the upper corner of the mouth looks flat.
<i>Arm Weakness</i>	If there is mild arm paralysis and the sufferer is not aware of it, then the paralyzed arm will fall and become out of alignment. In severe paralysis, the paralyzed arm will be difficult and cannot be lifted anymore, even to the point where it cannot be moved.
<i>Speech</i>	Speech becomes difficult and slurred (articulation is disturbed) or cannot speak or can speak but cannot understand people's questions so verbal communication is not connected.
<i>Time</i>	It's time to make an Emergency Call when you find symptoms of a stroke to minimize disability and provide more efficient treatment

Other methods such as BEFAST can also be used, namely Balance (loss of balance/dizziness), Eyes (vision problems in one or both eyes), Face (drooping face), Arm (weakness), and Speech (unclear speech). Finding any of these symptoms is

useful in diagnosing ischemic or hemorrhagic stroke.²⁴

Treatment before entering the hospital requires a fast and accurate response in dealing with stroke cases. The importance of being aware of stroke symptoms and

recognizing the signs of stroke is very essential, considering that almost 95% of stroke patients experience these symptoms before arriving at the hospital. This information has great significance, especially for the general public, families, loved ones, and health professionals such as family-centered doctors, emergency call center officers, emergency medical centers, and emergency personnel. They need to have a good understanding of the symptoms of stroke and the need for emergency treatment in stroke patients.²⁵ Pre-hospital treatment that can be carried out for patients suspected of having a stroke includes identifying the time of stroke symptoms and calling an ambulance immediately or activating the emergency system.²⁶

3.3 Treatment of stroke

Thrombolytic t-PA is the only specific treatment that has been proven through clinical trials to manage acute stroke. As recommended by the AHA/ASA, intravenous tPA infusion is the treatment modality of choice for patients presenting within the first 3 hours (4.5 hours for select patients) after the onset of symptoms.²⁷

Furthermore, the general management of patients with acute stroke involves several important aspects. For blood glucose levels, hypoglycemia is treated

with D50, and hyperglycemia is treated with insulin if the serum glucose level is more than 200 mg/dL. Blood pressure was regulated according to recommendations for candidates and non-candidates for thrombolysis. Cardiac monitoring is performed continuously to detect ischemic changes or atrial fibrillation. For intravenous fluids, avoid D5W and excessive fluid administration, with IV isotonic sodium chloride solution administered at 50 mL/hour unless otherwise indicated. Oral intake was initially restricted (NPO) due to the high risk of aspiration, and oral intake was avoided until swallowing ability was assessed. Oxygen is given if needed, especially if oxygen saturation (SaO₂) is less than 94%. Lastly, body temperature is maintained to avoid hyperthermia; use of oral or rectal acetaminophen and cooling blankets as needed.^{28,29}

Initial management of acute stroke is usually carried out in the emergency department and hospital. Family physicians have an important role in follow-up, ensuring that a complete diagnostic evaluation is performed, addressing modifiable risk factors, facilitating rehabilitation, and managing chronic sequelae.²⁸

The following table lists several treatment methods according to the type of stroke.

No	Treatment methods	References
Ischemic stroke		
1.	Blood thinning medication	
	<ul style="list-style-type: none"> • Thrombolytics Medications such as tissue plasminogen activator (rtPA) such as Alteplase are used to dissolve blood clots. The recommended onset of thrombolysis is the onset of symptoms ≤ 4.5 hours taking into account the inclusion and exclusion criteria.	Baig MU, et al
	<ul style="list-style-type: none"> • Antiplatelet Medications such as aspirin and clopidogrel help prevent the formation of additional blood clots, are recommended for patients with minor ischemic stroke, as long as there are no contraindications or high risk of bleeding.	Ford B, et al
	<ul style="list-style-type: none"> • Anticoagulants Medications such as warfarin are used to reduce the risk of blood clots forming. However, anticoagulation is not given until imaging examination results show that there is no primary intracranial bleeding.	Arsenault L, et al
2.	Medical procedures	

- Mechanical Thrombectomy
This is a procedure that involves placing a catheter through an artery, usually from the groin to a blocked artery in the brain. Oliveira AJF, et al
- Angioplasty and Stenting
This is an endovascular procedure that involves opening a blocked artery using a balloon and placing a stent to keep the artery open. Mohamaden M, et al

Hemorrhagic Stroke

- | | | |
|----|--|------------------|
| 1. | Blood pressure control
Medication to lower blood pressure is used to reduce the risk of further bleeding. | Ford B,
et al |
| 2. | Surgery | |
| | <ul style="list-style-type: none"> • Aneurysm Clipping
Surgical procedure to close the aneurysm and stop the bleeding by placing a small metal clip at the neck of the aneurysm. Zhu W, et al • Coiling Aneurysm
A procedure in which a metal coil is inserted into the aneurysm to prevent further bleeding. Zhu W, et al • Hematoma Evacuation
The procedure to remove blood collected due to bleeding in the brain, is usually considered in cases where the hematoma causes significant pressure on brain tissue, leading to neurological damage. Kellner CP, et al | |

3.4 Post Stroke Care

Post-stroke care is a dynamic process that involves ongoing assessment, management, and feedback, adapting over time to meet the patient's changing needs. In carrying out this process effectively, the AHA/ASA recommends a template that can be used in primary care visit planning that is rooted in contemporary chronic care management concepts. This template is designed to help clinicians achieve five widely accepted goals in poststroke care: (1) provide patient-centered care, (2) prevent recurrent brain injury, (3) optimize function, (4) avoid late complications, and (5) improve overall quality of life.^{19,36,37}

A six-component strategy proposed specifically for primary care clinicians aims to facilitate the achievement of these five key goals, with all practical components to be addressed during the patient visit. In the early stages after a stroke, the first post-stroke visit is very important and should occur soon after discharge from the acute care or rehabilitation facility, generally within one to three weeks. These early visits have the potential to reduce

readmissions and address omissions in care that may exacerbate the risk of stroke recurrence during the first three months post-discharge. It is important to note that the current average interval to the first medical visit for patients returning home after a stroke is 27 days.¹⁹

There are several main differences in stroke prevention and management between using a family doctor and without a family doctor. Family doctors have the responsibility for recognizing risk factors, educating healthy lifestyles, monitoring adherence to medication, managing blood pressure, controlling diabetes, and managing hyperlipidemia. With a family doctor, patients receive more continuous and personalized supervision, which increases effectiveness in the secondary prevention of stroke. Overall, the involvement of family physicians in stroke prevention and management provides a more structured, integrated, and personalized approach, which increases the effectiveness of secondary prevention and reduces the risk of recurrent stroke.³⁸

3.5 Long-term management after stroke

3.5.1 Management of spasticity

Spasticity is a motor and sensory disorder characterized by intermittent or sustained increases in tonic stretch reflexes accompanied by excessive tendon twitching, due to stretch reflex hyperexcitability. This is common after stroke, with the prevalence of motor disorders estimated at 80% in stroke sufferers.³⁹

To prevent spasticity, after a patient is discharged from the hospital, family physicians need to perform transition management that includes contact with the patient or caregiver within two working days of hospital discharge, as well as a face-to-face visit within 7 or 14 days depending on the complexity of the medical condition. This includes medication reconciliation and management, as well as reviewing the need for further diagnostic tests or treatment. If post-stroke assessment indicates a risk of spasticity (e.g., if assessment results show significantly increased muscle tone, loss of range of motion, functional or treatment problems, or a Modified Ashworth Scale (MAS) score ≥ 2), the patient should be monitored and referred immediately at the earliest sign of spasticity.^{40,41,42}

Each patient should be scheduled for routine primary care follow-up to monitor the development of spasticity; patients should be reviewed at 6 weeks and then regular follow-up should be performed in the first 6 months post-stroke. Patients at high risk should be referred for immediate evaluation by a spasticity assessor or rehabilitation center that specializes in spasticity.⁴⁰

3.5.2 Prevention of subsequent strokes and management of early complications

To prevent stroke recurrence, family doctors need to provide comprehensive care including optimizing chronic disease management, non-pharmacological lifestyle interventions, and pharmacological interventions. The family doctor arranges antithrombotic therapy according to the

type of stroke the patient is experiencing. For mild non-cardioembolic strokes and transient ischemic attacks, dual antiplatelet therapy with aspirin and clopidogrel is generally given and should be changed to single antiplatelet therapy after 21 to 90 days. Meanwhile, cardioembolic strokes such as those caused by atrial fibrillation require long-term anticoagulation. Direct oral anticoagulants are preferred over warfarin for patients with nonvalvular atrial fibrillation.^{23,24}

Family physicians need to ensure patients comply with prescribed secondary prevention medications. Family doctors also play a role in monitoring and managing risk factors such as hypertension, diabetes, and hyperlipidemia. Family doctors help patients achieve blood pressure targets below 130/80 mm Hg and manage diabetes with a hemoglobin A1c target of $\leq 7\%$. Family doctors also prescribe high-dose statins such as atorvastatin to lower LDL cholesterol.⁴³

Furthermore, the main goal of family doctors in managing early post-stroke complications is to provide immediate medical attention such as maintaining urgent airways, breathing, and blood circulation stability. Family doctors need to carry out careful neurological monitoring to detect worsening or improvement in neurological conditions. Prevention of complications such as aspiration pneumonia by monitoring for signs of dysphagia and implementing swallowing assessments and precautions. In addition, initiate early mobilization or use compression stockings to prevent venous thromboembolism, as well as change position and skin care to prevent pressure sores.^{44,45}

3.5.3 Family and caregiver education

Family doctors have the responsibility to provide education to families and caregivers regarding long-term management after stroke to support both the patient and the family and caregivers who care for them. The following are several important aspects that need to be

emphasized by family doctors in providing education to families and caregivers. 45,46,47,48,49,50,51

- First, understand stroke and its impact. Stroke is a condition that arises from the disruption of blood flow to the brain, which can have long-term effects on the patient's health, mobility, cognition, and communication.
- Second, drug management. Caregivers need to be informed about the importance of compliance in taking medication, the side effects that may arise, and the purpose of each medication prescribed, such as blood thinners and antihypertensive drugs.
- Third, rehabilitation and therapy. Rehabilitation therapies such as physical, occupational, and speech therapy play an important role in recovery and maintaining functional abilities. Caregivers are also taught techniques or exercises they can help with at home.
- Fourth, monitoring health and vital signs. The family doctor needs to instruct the caregiver to monitor and record vital signs such as blood pressure and heart rate, as well as changes in physical or mental condition that could indicate complications.
- Fifth, nutrition and diet. Family doctors need to provide guidance regarding a healthy diet that supports cardiovascular health and can reduce the risk of further strokes. Also, discuss special dietary needs due to difficulty swallowing or other post-stroke problems.
- Sixth, daily life activities. Teach the caregiver how to help with daily activities such as bathing, dressing, and mobility, taking into account the physical limitations caused by the stroke.
- Seventh, emotional support. Discuss the emotional impact of stroke on both the patient and caregiver. Provide

resources for coping strategies, support groups, and counseling if needed.

- Eighth, safety precautions. Educate on home safety modifications to prevent falls and accidents. Discuss strategies for safely managing medications and how to recognize emergency signs such as another stroke or heart attack.
- Ninth, long-term care planning. Help families understand the long-term care needs of stroke patients. Discuss options such as home care, assisted living facilities, or rehabilitation centers if needed.
- Tenth, regular visits and coordination of the health care team. Emphasize the importance of regular visits to health facilities, including general practitioners, neurologists, and specialists involved in stroke care. Encourage open communication between families, caregivers, and the health team.

By addressing these various aspects, families and caregivers can play a proactive role in supporting the recovery and long-term management of stroke patients, contributing significantly to their quality of life after stroke.⁴

3.5.4 Management of patient quality of life

There are various definitions of quality of life, but all of them emphasize that it includes subjective health involving physical, psychological, social, and mental aspects. Patients who experience chronic diseases such as stroke require long-term care. Low quality of life and poor psychological well-being can reduce patient compliance with their treatment, which can lead to the risk of stroke recurrence.^{52,53}

Family physicians play an important role in managing the quality of life of post-stroke patients because of their comprehensive approach to health care and their ongoing relationship with patients. To help improve the quality of life of patients after a stroke, a family doctor needs to provide emotional support and guidance to

help patients and families overcome physical, emotional, and cognitive challenges after stroke.^{54,55}

Family physicians focus on improving and maintaining patients' quality of life. This includes optimizing functional abilities through rehabilitation, treating chronic conditions exacerbated by stroke, and managing psychological well-being. In handling the psychological well-being of post-stroke patients, family doctors are seen as important supporters, advisors, and healers. For isolated patients, a visit to a family doctor's clinic can provide social contact; for the fragile, a family doctor can be a lifeline; for those confused by the health system, a family doctor can serve as an advocate and provider of guidance.⁵⁶

4.CONCLUSION

Stroke is a significant global health problem, and its prevention, recognition, and management are critical to reducing the burden of associated morbidity and mortality. The role of family medicine in stroke management, from prevention to post-stroke care, is critical to ensuring optimal patient outcomes and improving the quality of life for stroke survivors. By adopting a comprehensive and patient-minded approach, healthcare providers can have a significant positive impact on the lives of stroke patients and their families.

In long-term stroke management, the family doctor plays a central role in the multidisciplinary team, ensuring comprehensive and sustainable holistic care for stroke patients in the community. Family doctors have responsibilities in recognizing risk factors, monitoring adherence to treatment, blood pressure management, preventing post-stroke spasticity, preventing subsequent strokes, optimizing the management of chronic diseases, managing early complications, educating healthy lifestyles, controlling diabetes, managing hyperlipidemia, and managing the quality of life of post-stroke patients.

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