



Knowledge of stroke and myocardial infarction prevention among hypertensive patients at An Lao general Hospital, Hai Phong city in 2025

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ABSTRACT

Objective: To describe the knowledge regarding the prevention of stroke and myocardial infarction (MI) and to identify its associated factors among patients with hypertension at An Lao General Hospital, Hai Phong City, Vietnam in 2025. **Methods:** A descriptive cross-sectional study was conducted among 267 hypertensive patients at An Lao General Hospital, Hai Phong City, Vietnam, from March to June 2025. Data were collected using a structured questionnaire adapted from the validated Stroke Knowledge Test and the Knowledge on Prevention of Myocardial Infarction instrument. Multivariate logistic regression analysis was performed to identify independent predictors of adequate preventive knowledge, with statistical significance established at $p < 0.05$. **Results:** Patients had adequate knowledge about stroke and myocardial infarction prevention was 87.6%. Patients working as farmers or in informal labor had significantly lower levels of knowledge regarding stroke and myocardial infarction prevention than those who were government employees, office staff, industrial workers, or retirees ($p < 0.05$). **Conclusion:** Patients with hypertension had gaps in their knowledge of stroke and myocardial infarction prevention. The hospital should develop a health education plan for patients with hypertension.

Keywords: Hypertension; knowledge; stroke prevention; myocardial infarction

INTRODUCTION

Hypertension is one of the leading risk factors for death and disability worldwide ¹. In 2024, an estimated 1.4 billion adults aged 30–79 years were living with hypertension, predominantly in low- and middle-income countries (LMICs); alarmingly, only 23% of this population had achieved adequate blood pressure control ². Given its high prevalence and serious consequences, hypertension is an urgent public health concern and increases the risk of stroke, myocardial infarction, heart failure, and other serious cardiovascular complications ³.

Acute MI and stroke represent catastrophic cardiovascular endpoints with profound physical, psychosocial, and economic consequences. Globally, the prevalence of MI is estimated at 3.8% among individuals under 60 years and 9.5% among older adults ⁴, while the incidence of ischemic stroke surged by nearly 88% between 1990 and 2021 ^{5,6}. The prevalence of stroke among older adults has been estimated at 7.4%, including 7.0% in men and 6.4% in women ⁷. Preventing stroke and myocardial infarction depends in part on patients' knowledge of hypertension and

its complications. However, studies have reported limited knowledge of hypertension and its complications, particularly in low- and middle-income countries. A study in Ethiopia reported mean scores of 44.1% for knowledge of stroke risk factors and 49.7% for stroke prevention ⁸. In Vietnam, a study of patients with hypertension found that only 45.5% correctly identified people at high risk of stroke and 52.2% correctly identified stroke risk factors ⁹. These findings highlight the need to improve patients' knowledge of stroke and myocardial infarction prevention.

An Lao General Hospital in Hai Phong City provides health services to the local community and treats many patients with hypertension. However, no specific study had assessed these patients' knowledge of stroke and myocardial infarction prevention. This study therefore aimed to describe knowledge of stroke and myocardial infarction prevention among patients with hypertension at An Lao General Hospital in 2025 and to identify associated factors.

MATERIALS AND METHODS

Study design and setting: A descriptive cross-sectional study was conducted from March to June 2025 at An Lao General Hospital in Hai Phong City, Vietnam.

Participants and sampling: The target population comprised adult patients formally diagnosed with hypertension who were receiving inpatient treatment at the facility. A convenience sampling technique was employed to recruit participants. The minimum sample size was determined using the single population proportion formula.

$$n = Z_{(1-\alpha/2)}^2 \frac{p(1-p)}{d^2}$$

Assuming an expected adequate knowledge prevalence of 50% ($p = 0.5$)

to yield the maximum sample size, a 95% confidence level, and a 6% margin of error ($d = 0.06$), the required sample size was calculated to be 267 patients. Recruitment continued consecutively until this target was met.

Inclusion criteria: Patients were included if they were diagnosed with hypertension and provided voluntary informed consent

Exclusion criteria: encompassed patients presenting with acute stroke, severe heart failure, unstable angina, or significant psychiatric and cognitive impairments that precluded active participation in a structured interview.

Instruments: Data were collected using a structured questionnaire comprising three sections:

Socio-demographic and Clinical Characteristics: included gender, age, educational attainment, occupation, marital status, body mass index (BMI), hypertension grade, duration of the disease, and family history of stroke or myocardial infarction (MI).

Knowledge of Stroke Prevention: Evaluated using the Stroke Knowledge Test (SKT) originally developed by Sullivan (2006) ¹⁰ and validated in the Vietnamese context by Nguyen Hoai Thu (2023) ⁹. This section contained 13 items covering stroke risk factors, warning signs, consequences, prevention, and treatment. Scoring was based on a predefined weighted scale, yielding a maximum possible score of 37 points. Higher scores indicated a greater understanding of stroke prevention.

Knowledge of MI Prevention: Assessed using an adapted instrument by Panta and Basnet (2018) ¹¹. This section consisted of 5 items focusing on MI symptoms, risk

factors, and preventive strategies, with a maximum achievable score of 33 points.

The overall preventive knowledge score was calculated by summing the two subscale scores (maximum possible score of 70). Based on established literature, a cutoff threshold of 70% was applied; participants scoring 49 points or higher were classified as having “adequate knowledge”, while those scoring below 49 points were categorized as having “inadequate knowledge”¹².

To ensure cultural and clinical appropriateness, the integrated questionnaire underwent expert review by a panel comprising two senior physicians and one clinical nurse specialist in cardiovascular care. The item-level content validity index (I-CVI) and the scale-level content validity index based on universal agreement (S-CVI/UA) were both 1.0, indicating excellent expert consensus. For reliability testing, a pilot study was conducted with 30 hypertensive patients using a test-retest approach with a 4- to 5-day interval. The resulting Cohen’s Kappa coefficient was 0.556 ($p < 0.001$), indicating moderate but acceptable instrument stability for this population.

Data collection procedures: Following formal approval from the hospital administration, three medical social workers from the hospital’s Social Work Department were recruited and comprehensively trained as research assistants to standardize the interview process. Eligible patients were approached during their routine visits to the pharmacy for antihypertensive medication refills or during stable inpatient admissions. The research assistants explained the study’s objectives and obtained written informed consent. Data were collected via face-to-face interviews lasting approximately

30 to 45 minutes. Questionnaires were immediately reviewed post-interview to ensure data completeness and accuracy.

Data collection: The research team requested permission from the hospital leadership to conduct the study at the unit. Three collaborators, all staff members from the hospital’s Social Work Department, were selected and trained in the process and skills of information collection before conducting the survey. When patients came to receive their hypertension medication or receive stable treatment at the departments, the collaborators requested permission to interview them, clearly explaining the purpose and content of the study. Patients who agreed to participate signed a consent form. Information was collected through direct interviews using a pre-designed questionnaire, with an average duration of 30–45 minutes. Immediately after each interview, the survey forms were reviewed to ensure the completeness and accuracy of the collected information.

Statistical analysis: Data were entered using EpiData 3.1 and analyzed using SPSS 20.0. Frequencies and percentages were used to describe participants’ characteristics and knowledge. Logistic regression was used to examine factors associated with knowledge of stroke and myocardial infarction prevention. A p -value < 0.05 was considered statistically significant.

Ethical considerations: Participants were informed about the study objectives, participation was voluntary, and they could stop the interview at any time. The confidentiality of personal information was protected. The study was approved by the Ethics Committee of Nam Dinh University of Nursing (Decision No. 609/GCN-HDDD) and by An Lao General Hospital, Hai Phong City.

RESULTS**Table 1. Sociodemographic and clinical characteristics of participants (n = 267)**

Characteristics		Frequency (n)	Percentage (%)
Gender	Male	137	51.3
	Female	130	48.7
Age group (years)	< 60	34	12.7
	≥ 60	233	87.3
Educational level	High school and below	190	71.2
	Intermediate and college	64	24
	University degree or higher	13	4.9
Occupation	Farmers, and informal workers	193	72.3
	Civil servants, industrial workers, retirees	74	27.7
Marital status	Married	255	95.5
	Separation/Divorce/widowed	12	4.5
Body Mass Index (BMI)	Underweight (< 18.5 kg/m ²)	8	3
	Normal (18.5–22.9 kg/m ²)	184	68.9
	Overweight, obese (≥ 23.0 kg/m ²)	75	28.1
Hypertension grade	Grade 1	225	84.3
	Grade 2	25	9.4
	Grade 3	17	6.4
Duration of hypertension	≤ 5 years	148	55.4
	> 5 years	119	44.6
Family history of stroke/myocardial infarction	Yes	9	3.4
	No	258	96.6

A total of 267 hypertensive patients participated, with a relatively even gender distribution (51.3% male). The majority were aged 60 years or older (87.3%), had completed high school or less (71.2%), and were engaged in farming or informal labor (72.3%). Clinically, most participants presented with a normal BMI (68.9%), grade 1 hypertension (84.3%), a disease duration of 5 years or less (55.4%), and no family history of stroke or myocardial infarction (MI) (96.6%).

Table 2. Correct responses regarding stroke prevention knowledge (n = 267)

Knowledge Item	Correct Responses (n)	Percentage (%)
Most common type of stroke	264	98.9
Location of stroke	152	56.9
Condition associated with the greatest increase in stroke risk	229	85.8
Age groups at risk of stroke	225	84.3
Signs of stroke	190	71.2
Purpose of stroke rehabilitation	245	91.8
Modifiable risk factors	242	90.6
Stroke treatment methods	82	30.7
Unmodifiable risk factors	193	72.3
Consequences of stroke	222	83.1
Preventing the risk of stroke	254	95.1
Treatment of hypertension	94	35.2
When to call emergency services (115)	254	95.1

Participants demonstrated high knowledge regarding the most common type of stroke (98.9%), stroke prevention (95.1%), and emergency response (95.1%). Conversely, knowledge deficits were prominent regarding stroke treatment methods (30.7%), hypertension management (35.2%), and the anatomical location of a stroke (56.9%).

Table 3. Correct responses regarding MI prevention knowledge (n = 267)

Knowledge Item	Correct Responses (n)	Percentage (%)
Symptoms of myocardial infarction	169	63.3
Risk factors for myocardial infarction	179	67
Dietary measures to prevent myocardial infarction	121	45.3
Exercise to prevent myocardial infarction	130	48.7
Action to take if myocardial infarction is suspected	267	100

All participants (100%) correctly identified the necessary actions when an MI is suspected. However, substantial knowledge gaps were observed concerning preventive lifestyle modifications, specifically dietary measures (45.3%) and exercise regimens (48.7%).

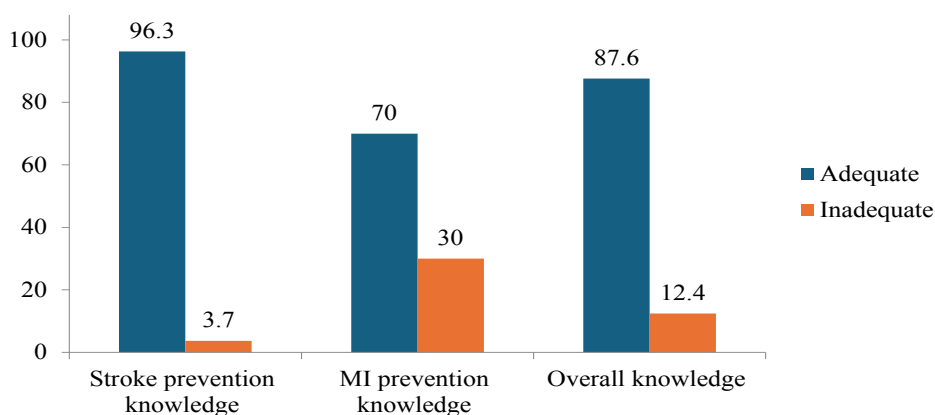


Figure 1. Classification of participants' knowledge of stroke and myocardial infarction prevention (n = 267)

Figure 1 shows that 87.6% of participants had adequate overall knowledge of stroke and myocardial infarction prevention, while 12.4% had inadequate knowledge. Adequate knowledge was more common for stroke prevention (96.3%) than for myocardial infarction prevention (70.0%).

Table 4. Associations between participants' characteristics and knowledge of stroke and myocardial infarction prevention (n = 267)

Variable			Knowledge				OR CI 95%	p (χ^2 test)
			Inadequate		Adequate			
			N	%	N	%		
Gender	Male		14	10.2	123	89.8	0.66 (0.31-1.38)	0.278
	Female		19	14.6	111	85.4		
Age group (years)	< 60		7	20.6	27	79.4	2.06 (0.81-5.21)	0.125
	≥ 60		26	11.2	207	88.8		
Educational level	Below High School	High	31	16.3	159	83.7	7.31 (1:70-31:35)	0.007
	High school or higher		2	2.6	75	97.4		
Occupation	Farmers, and informal workers		31	16.1	162	83.9	6.88 (1:60-29:56)	0.009
	Civil servants, industrial workers, retirees		2	2.7	72	97.3		

Variable			Knowledge				OR CI 95%	p (χ^2 test)
			Inadequate		Adequate			
			N	%	N	%		
Marital status	Separated/ divorced/widowed		4	33.3	8	66.7	3.89 (1:10-13:75)	0.035
	Married		29	11.4	226	88.6		
BMI	Not overweight/ obese		25	13	167	87	1.25 (0.53-2.91)	0.600
	Overweight/ obesity		8	10.7	67	89.3		
Hypertension grade	Grade 1		28	12.4	197	87.6	1.05 (0.38-2.90)	0.922
	Grades 2–3		5	11.9	37	88.1		
Duration of hypertension	≤ 5 years		17	11.5	131	88.5	0.83 (0.40-1.73)	0.629
	> 5 years		16	13.4	103	86.6		
Family history of stroke, myocardial infarction.	Yes		3	33.3	6	66.7	3.80 (0.90-15.99)	0.069
	No		30	11.6	228	88.4		

In the univariate analysis, educational level, occupation, and marital status were significantly associated with knowledge of stroke and myocardial infarction prevention ($p < 0.05$). Sex, age group, BMI, hypertension grade, duration of hypertension, and family history of stroke or myocardial infarction were not significantly associated with knowledge ($p > 0.05$).

Table 5. Multivariable logistic regression analysis of factors associated with knowledge of stroke and myocardial infarction prevention (n=267)

Variable		B	OR CI 95%	p (χ^2 test)
Gender	Male	-0.14	0.86 (0.39-1.91)	0.723
	Female			
Age group (years)	< 60	0.69	2.00 (0.70-5.73)	0.194
	≥ 60			
Educational level	Below High School	1.14	3.13 (0.28-34.29)	0.350
	High school or higher			

	Variable	B	OR CI 95%	p (χ^2 test)
Occupation	Farmers, and informal workers	0.75	2.12 (0.19-23.2)	0.024
	Civil servants, industrial workers, retirees			
Marital status	Separated/divorced/widowed	1.11	3.06 (0.78-11.92)	0.107
	Married			
BMI	Not overweight/obese	0.12	1,127 (0.45-2.76)	0,794
	Overweight/obesity			
Hypertension grade	Grade 1	0.29	1.33 (0.42-4.17)	0.617
	Grades 2–3			
Duration of hypertension	≤ 5 years	-0.13	0.87 (0.35-2.15)	0.767
	> 5 years			
Family history of stroke, myocardial infarction.	Yes	1.05	2.86 (0.59-13.89)	0.191
	No			

The multivariable logistic regression analysis indicated that occupation was the only factor significantly associated with inadequate knowledge of stroke and myocardial infarction prevention; the reported p-value was <0.05. The other factors were not statistically significant ($p > 0.05$).

DISCUSSION

Participant characteristics: Among the 267 patients with hypertension, 51.3% were men and 48.7% were women, indicating a nearly equal distribution by gender. This differs from the study by Nguyen Van Trieu ¹³ (2023), in which men accounted for 97.11% of participants. The difference may reflect variations in the study populations and settings, or differences in health-seeking and hypertension-management behaviors among women.

Most participants had completed high school or less (71.2%), and 72.3% were farmers or informal workers. These characteristics may affect patients' knowledge of stroke and myocardial

infarction prevention, particularly when they have limited access to health education from healthcare professionals. Most participants were aged 60 years or older (87.3%), and 95.5% were married. The age distribution was broadly comparable with that reported by Nguyen Van Trieu ¹³ (2023), in which participants aged 60–79 years formed the largest group (67.49%); most participants in that study lived with their families (97.66%).

Knowledge of stroke and myocardial infarction prevention: Regarding stroke prevention, 98.9% correctly identified cerebral arterial occlusion as the most common stroke etiology, and 95.1% demonstrated an understanding of general stroke prevention. These figures surpass the

knowledge levels reported in both domestic (Nguyen Hoai Thu, 2023)⁹ and international (Tuli et al., 2024)⁸ cohorts, where adequate stroke prevention knowledge was observed in 70.9% and 49.7% of patients, respectively. Participants also demonstrated a strong recognition of modifiable (90.6%) and non-modifiable (72.3%) risk factors, as well as warning signs (71.2%), exceeding the prevalence ranges reported in a recent systematic review by Melak et al.¹⁴.

However, critical knowledge gaps persist regarding comprehensive disease management. Only 30.7% of participants fully grasped stroke treatment options, and merely 35.2% understood that hypertension management requires a combination of pharmacotherapy and lifestyle modifications. Furthermore, anatomical knowledge of stroke occurrence was limited (56.9% correct). This tendency to over-rely on medication while neglecting holistic behavioral interventions highlights a critical area for targeted patient education.

A similar pattern emerged regarding MI prevention. Overall, 70.0% of participants possessed adequate knowledge of MI prevention, demonstrating a stronger awareness compared to previous cohorts in Nepal (Panta & Basnet¹¹, Adhikari et al.¹⁵), which reported adequate knowledge rates ranging from 46.5% to 60.5%. Notably, 100% of participants correctly identified the necessary emergency actions for a suspected MI. Nevertheless, knowledge regarding preventive lifestyle adjustments remained alarmingly low, with only 45.3% and 48.7% correctly answering questions on dietary measures and exercise, respectively. These findings corroborate the need to shift educational focus from acute symptom recognition toward proactive, lifestyle-based cardiovascular disease prevention.

Factors associated with knowledge of stroke and myocardial infarction prevention:

Sex was not significantly associated with knowledge of stroke and myocardial infarction prevention in this study ($p > 0.05$). This differs from Adhikari et al.¹⁵, who reported a higher proportion of women with good knowledge of myocardial infarction prevention (75.86%) than men (43.47%). Panta et al.¹¹ also reported a significant association between sex and knowledge of myocardial infarction prevention ($p = 0.002$). The reasons for these differing findings cannot be established from the present data.

Educational level was not significantly associated with knowledge of stroke and myocardial infarction prevention in the multivariable analysis ($p > 0.05$). This differs from Melak et al.¹⁴, who reported that inadequate knowledge and practice of stroke prevention were associated with lower educational attainment. Adhikari et al.¹⁵ found that literate participants were more likely to have good knowledge of myocardial infarction prevention than those who were illiterate. Panta et al.¹¹ also reported an association between educational level and knowledge of myocardial infarction. Differences may be related to study populations, instruments, or analytical approaches.

Occupation was significantly associated with knowledge in the multivariable analysis as reported by the authors ($p < 0.05$). Farmers and informal workers had a higher proportion of inadequate knowledge than civil servants, public-sector employees, industrial workers, and retirees. This is consistent with Melak et al.¹⁴, who found that people with lower incomes and less stable employment had poorer knowledge

than those with higher incomes and stable employment. Limited opportunities to access health information may contribute to this difference; however, this explanation was not directly tested in the present study.

This descriptive cross-sectional study of 267 patients assessed knowledge of stroke and myocardial infarction prevention and related factors among patients with hypertension. Because of time and resource constraints, no qualitative component was conducted to explore in depth the factors influencing patients' knowledge. The findings may inform the development of future intervention studies to evaluate the effectiveness of targeted patient education.

CONCLUSION

Patients with hypertension had gaps in their knowledge of stroke and myocardial infarction prevention. The main gaps concerned stroke treatment, hypertension management, the location of stroke, and dietary and exercise measures for myocardial infarction prevention. Farmers and informal workers had a higher proportion of inadequate knowledge than civil servants, public-sector employees, industrial workers, and retirees.

RECOMMENDATIONS

The hospital should develop a health education plan for patients with hypertension focused on stroke and myocardial infarction prevention. Priority topics should include stroke treatment, hypertension management, the consequences of stroke, and dietary and exercise measures for myocardial infarction prevention. Education should be tailored to patients in occupations with less stable employment or potentially fewer opportunities to access health information.

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