

# Sensibilização para o AVC: Uma Análise Transversal

## Stroke Awareness: A Cross-Sectional Analysis

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### Abstract

**Introduction:** Our objective was to evaluate the awareness of cerebrovascular disease (CVD) diagnosis, risk factors, and potential for recurrence in hospitalized patients.

**Material and Methods:** Cross-sectional analysis, with consecutive inclusion of 530 patients with stroke or transient ischemic attack (TIA) admitted to a tertiary-care center between May and November 2019. Inclusion criteria encompassed: 1) admission diagnosis of stroke or TIA and 2) age  $\geq 18$  years old. Exclusion criteria comprised 1) aphasia, 2) cognitive impairment or dementia, 3) depressed consciousness, 4) severe hypoacusia and 5) inability or refusal to provide written informed consent. A standardized questionnaire was applied in a face-to-face interview in the first 12 to 72 hours of hospitalization.

**Results:** Two-hundred, twenty patients were included, mostly males (58.2%;  $n=128$ ), with a mean age of 68 years old. 23% ( $n=51$ ) were unaware of their stroke or TIA diagnosis. Most patients did not recognize any risk factor for CVD by free recall. Yet, when confronted with a list of possible risk factors, hyperlipidemia (98%) and hypertension (97%) were the most recognized. A percentage of 74% ( $n=163$ ) of the sample believed to be at risk of a new cerebrovascular event. Although 85% ( $n=188$ ) agreed that the recurrence risk would decrease by controlling risk factors, only 66% ( $n=146$ ) recognized appropriate strategies.

**Conclusion:** This study depicted suboptimal knowledge regarding stroke diagnosis, its' risk factors, and the potential of recurrence in hospitalized patients with CVD. Prompt patient education strategies are warranted to promote behavior changes.

**Keywords:** Awareness; Health Knowledge, Attitudes, Practice; Stroke/prevention and control; Stroke Rehabilitation.

### Resumo

**Introdução:** O nosso objetivo foi avaliar a percepção do diagnóstico de doença vascular cerebral (DVC), seus fatores de risco e potencial de recorrência em doentes hospitalizados.

**Material e Métodos:** Estudo transversal com inclusão consecutiva de 530 doentes com acidente vascular cerebral (AVC) ou acidente isquémico transitório (AIT), admitidos num centro terciário entre maio e novembro de 2019. Os critérios de inclusão foram: 1) diagnóstico de admissão hospitalar de AVC ou AIT e 2) idade  $\geq 18$  anos. Os critérios de exclusão foram 1) afasia, 2) défice cognitivo ou demência, 3) depressão do estado de consciência, 4) hipoacusia severa e 5) incapacidade ou recusa em fornecer consentimento informado. Um questionário estandardizado foi aplicado em entrevista clínica presencial, nas primeiras 12 a 72 horas de hospitalização.

**Resultados:** Foram incluídos 220 doentes, a maioria do sexo masculino (58,2%;  $n=128$ ), com uma idade média de 68 anos. Desconheciam o seu diagnóstico de admissão (AVC ou AIT) 23% ( $n=51$ ). A maioria dos doentes não identificou fatores de risco para DVC quando questionados diretamente. No entanto, quando confrontados com uma lista de fatores de risco possíveis, a dislipidemia (98%) e a hipertensão (97%) foram os mais frequentemente reconhecidos. Da amostra, 74% ( $n=163$ ) considerava-se em risco de um novo evento cerebrovascular. Apesar de 85% ( $n=188$ ) concordar que o risco de recorrência diminuiria com o controlo dos fatores de risco, apenas 66% ( $n=146$ ) conhecia estratégias de prevenção.

**Conclusão:** Este estudo revelou um conhecimento sub-ótimo relativamente ao diagnóstico, fatores de risco e potencial de recorrência em doentes hospitalizados por DVC aguda. Assim, a implementação de estratégias de

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educação dos doentes é desejável para promover alterações do comportamento dos mesmos.

**Palavras-chave:** *Acidente Vascular Cerebral/prevenção e control; Conhecimentos, Atitudes e Prática em Saúde; Conscientização; Reabilitação do Acidente Vascular Cerebral.*

## Introduction

Stroke is a significant cause of mortality and disability worldwide, posing as one of the leading causes of DALYs (disability-adjusted life-years).<sup>1</sup> Furthermore, stroke is the leading neurological disorder requiring rehabilitation care (around 86 million people).<sup>2</sup> Indeed, in stroke survivors, rehabilitation programs remain the essential recommended treatment option for post-stroke functional limitations and disability.<sup>3</sup>

Up to 90% of the global burden of cerebrovascular disease (CVD) is related to modifiable risk factors.<sup>4</sup> Overall, the risk of recurrent CVD is nearly 25% and these events are more often lethal and disabling in comparison with index events. Lifestyle modifications and therapeutic optimization prevent up to 80% of recurrent CVD.<sup>5,6</sup> Increasing illness perception and awareness appears to be a modifiable target of treatment given the unacceptably high rate of CVD recurrence. Moreover, as there is a substantial knowing-doing gap in acute stroke, optimizing CVD knowledge will also probably improve rapid response at symptom onset, thereby reducing mortality and disability.<sup>7</sup>

Nonetheless, the hitherto literature is scarce regarding CVD diagnosis and risk factors awareness among acute CVD survivors. Although some studies have addressed the knowledge of stroke signs and symptoms on population-based samples, limited data on risk factors awareness is available.<sup>8,9</sup> Most available studies were performed on the general population<sup>10,11</sup> or ambulatory patients,<sup>8,9</sup> so data regarding hospitalized patients is limited.<sup>12-14</sup>

We aimed to evaluate acute CVD survivors' awareness of their diagnosis, risk factors, and risk of recurrence.

## Material and Methods

### Patient Selection and Data Collection

A cross-sectional study was performed, with consecutive inclusion of 530 patients admitted to the Stroke Unit and all Internal Medicine wards of a tertiary-care center in Portugal, between 01/May and 30/November 2019. Inclusion criteria encompassed the admission diagnosis of stroke or transient ischemic attack (TIA) and age older than 18 years old.

Exclusion criteria comprised the following: 1) aphasia,

considered when a score  $\geq 1$  in the 9th question of the National Institutes of Health Stroke Scale (NIHSS) was encountered, and 2) cognitive impairment assessed by the Mini-Mental State Evaluation (MMSE). The presence of cognitive impairment was assumed if a score  $< 15$  points was obtained in illiterate patients,  $< 22$  points when the patient education level ranged between one and 11 years, and  $< 27$  points in patients with more than 12 years of education.<sup>15</sup> Other exclusion criteria were: 3) history of dementia (depicted from electronic clinical records (ECR)); 4) depressed consciousness; 5) severe hypoacusia; 6) more than one stroke at the study period and 7) denial to provide written informed consent.

This study was conducted after approval by the local ethics review board (*Comissão de Ética para a Saúde do Centro Hospitalar Universitário de São João; n° 115-19*) and was performed in accordance with the Helsinki Declaration. All participants provided written informed consent.

We retrieved data from ECR regarding socio-demographic characteristics, namely gender, age, number of education years, and independence in activities of daily-living (assessed through the modified Rankin score [mRs]). Moreover, medical and family history information was also gathered from ECR. Additionally, data regarding the lesions' characteristics, namely the type of CVD, the lesion topography (in stroke patients) and its' severity (evaluated through the score on the NIHSS at hospital admission) was also appraised.

### Disease Perception Assessment

Two independent investigators applied a standardized survey to all eligible patients in a face-to-face interview between 12 and 72 hours of hospitalization. Due to the absence of validated instruments to assess risk factor perception and diagnosis and recurrence awareness for stroke survivors by the date this study was designed, we constructed and used a non-validated questionnaire based in previous investigations in this field.<sup>16-19</sup>

The survey assessed patient perception about stroke or TIA diagnosis, risk factors, and the risk of recurrence. The form included open (free recall) and closed questions. A Likert-type scale (1 to 5 points) was applied to evaluate the degree of concern regarding the health status.

### Statistical Analysis

The sample size was calculated using EpiTools® epidemiological calculators. For a confidence level of 95%, with 5% precision, using 85% as the mean proportion of awareness of stroke diagnosis,<sup>20</sup> the minimal sample size was of 196 patients.

Statistical analysis was performed using SPSS software version 26 (IBM Corporation, Armonk, NY). Patients' characteristics are presented using descriptive statistics:

categorical variables are summarized as frequencies and percentages, and continuous variables as means and standard deviations (variables with normal distributions) and medians and interquartile ranges (variables with skewed distributions). Normal distribution was checked using histogram visual analysis. As appropriate, the Chi-square test or Fisher's exact test were used to compare categorical variables. Continuous variables were compared between groups using independent samples t-test or Mann-Whitney U test, in accordance with the variable distribution. All reported p-values are two-tailed, with a  $p$ -value  $<0.05$  indicating statistical significance.

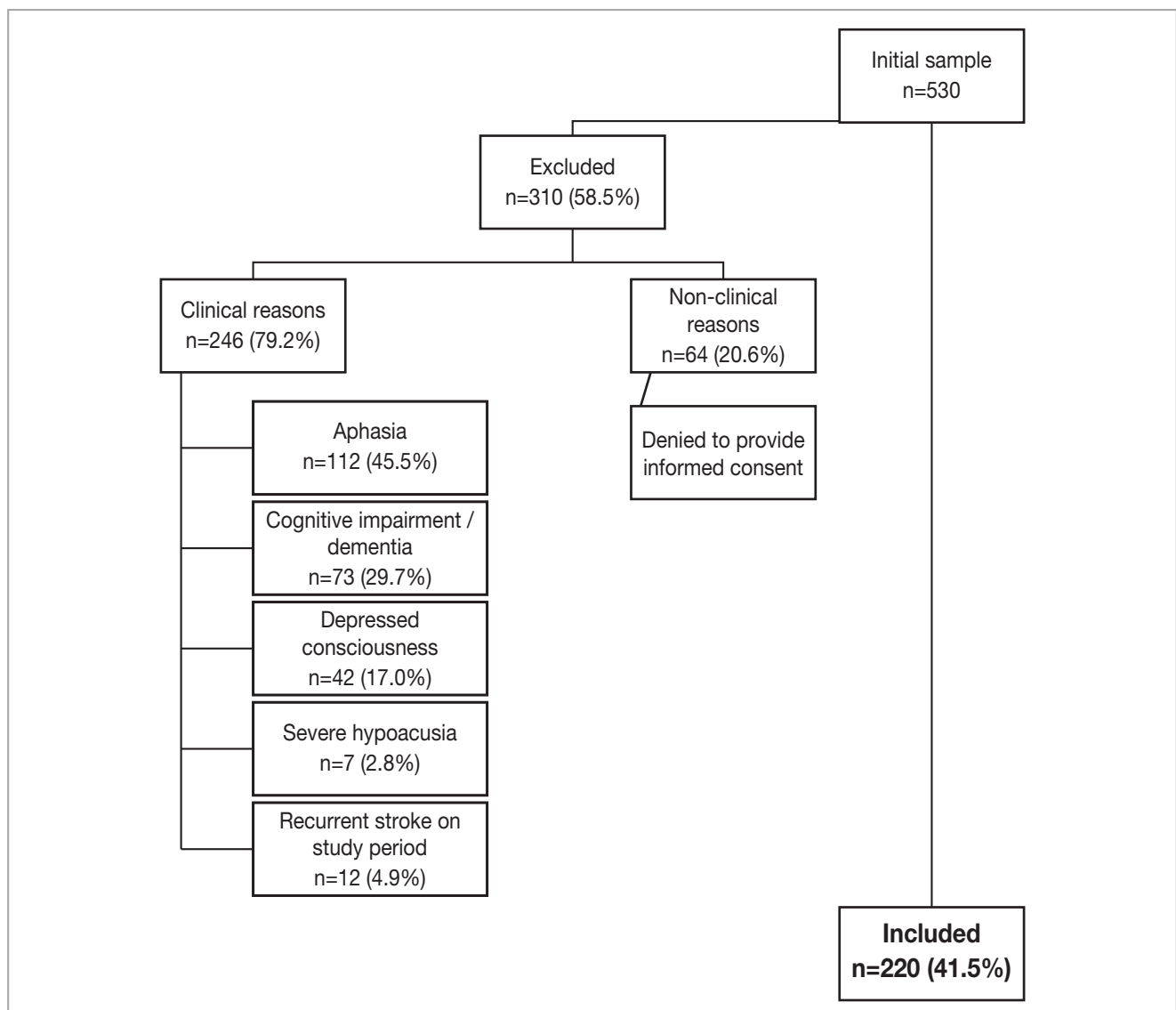
## Results

During the study period, 530 adult patients were admitted

due to stroke or TIA. Three-hundred ten 310 (58.5%) were excluded: 246 due to clinical motives (exclusion criteria) and 64 due to non-clinical reasons (denial to provide informed consent). The flowchart of patient selection is displayed in Fig. 1.

A total of 220 patients were included, mostly males (58.2%;  $n=128$ ), with a mean age of 68 years old (standard deviation of 11.8). Most patients presented at least one comorbidity, being hypertension (70%;  $n=154$ ), hyperlipidemia (64%;  $n=141$ ) and diabetes mellitus (42%;  $n=91$ ) the most identified. Ischemic lesions were present in 46.8% of patients, mainly on the right hemisphere (57%;  $n=58$ ) and affecting mostly the middle circulation (59%;  $n=66$ ). The demographic and clinical characteristics of the sample are displayed in Table 1.

Two-hundred twenty patients (92%) thought to be aware of



**Figure 1** - Flow-chart of patient's selection.

**Table 1** - Demographic and clinical characteristics of included patients.

Characteristic.	
Male gender, n (%)	128 (58.2)
Age, $\mu \pm$ SD	67.9 $\pm$ 11.8
MMSE score, $\mu \pm$ SD	27.8 $\pm$ 2.3
Number of years of education n (%)	
Zero years	3 (1.4)
Less than four years	124 (57.7)
five to 11 years	57 (26.5)
More than 12 years	31 (14.4)
mRS, $\mu \pm$ SD	0.8 $\pm$ 1.0
Type of stroke n (%)	
Ischemic	103 (46.8)
Hemorrhagic	18 (8.2)
TIA	28 (12.7)
No-image stroke	71 (32.3)
Circulation, n (%)	
Anterior	8 (7.1)
Middle	66 (58.9)
Posterior	38 (33.9)
Side of lesion, n (%)	
Left	44 (36.3)
Right	58 (47.9)
Bilateral	19 (15.7)
NIHSS, median (IQR)	3 (4)
Comorbidities n(%)	
Hypertension	154 (70.3)
Diabetes mellitus	91 (41.6)
Hyperlipidemia	141 (64.4)
Obesity	45 (20.5)
Arrhythmias	22 (10.0)
Chronic renal disease	15 (6.9)
Hyperuricemia	8 (3.7)
Heart failure	42 (19.2)
Epilepsy	5 (2.2)
Migraine	6 (2.7)

Cancer	19 (8.7)
Infectious pathology	8 (3.7)
Sleep apnea	15 (7.0)
Smoking habits	66 (30.1)
Ethylic habits	70 (32.0)
Personal history of stroke	51 (23.5)
Family history of stroke	47 (21.7)

IQR: interquartile range; MMSE: Mini-Mental State Examination; mRS: modified Rankin scale; n: total number of patients (absolute frequency); NIHSS: National Institutes of Health Stroke Scale; SD: standard deviation;  $\mu$ : mean; %: percentage (relative frequency)

their admission diagnosis. Nevertheless, only 169 (77%) correctly named stroke or TIA as the admission diagnosis. Overall, 23% (n=51) of our sample was unaware of the admission diagnosis.

An analysis to assess which factors influenced the admission diagnosis knowledge was then performed. Higher MMSE (28.0 $\pm$ 2.2 vs 26.8 $\pm$ 2.4,  $p=0.001$ ), younger age (67.1 $\pm$ 12.1 vs 71.0 $\pm$ 10.4,  $p=0.036$ ), and family history of CVD (80.6% vs 61.7%,  $p=0.007$ ) were significantly associated with an accurate perception of the admission diagnosis.

Regarding CVD risk factors identification by free-recall, 103 patients (47%) linked stroke to vascular risk factors; yet only 76 (34%) could identify at least one stroke risk factor. A bivariate analysis was performed to evaluate if any of the socio-demographic or clinical characteristics were significantly associated with the ability of identifying stroke risk factors. Male gender (69.7% vs 30.3%,  $p=0.014$ ), younger age (64.9 $\pm$ 11.3 vs 69.6 $\pm$ 11.8,  $p=0.005$ ) and previous stroke history (45.1% vs 30.1%,  $p=0.048$ ) were the only factors significantly associated with the ability to identify stroke risk factors in our sample.

When confronted with a list of possible risk factors (closed-type questions), CVD survivors had higher hit rates. The risk factors most recognized were hyperlipidemia (98%; n=216), hypertension (97%; n=214), smoking (94%, n=208), ethylic habits (94%, n=207) and cardiac arrhythmias (94%, n=207) (Table 2).

Furthermore, through bivariate analysis, we have evaluated the relationship between having a risk factor and identifying it as related to the stroke. There was a significant association ( $p<0.001$ ) between having hypertension and identifying this factor as "of risk" for stroke. Similar results were found for age ( $p<0.001$ ), previous stroke history ( $p<0.001$ ), family history of stroke ( $p<0.001$ ), diabetes mellitus ( $p<0.001$ ), hyperlipidemia ( $p<0.001$ ), obesity ( $p<0.001$ ), cardiac



**Table 2** - Prevalence of correct identification of cerebrovascular disease risk factors with closed-type questions (risk factor list).

Characteristic	n (%)
Age	168 (76.4)
Gender	81 (36.8)
Race	28 (12.7)
Family history of stroke	145 (65.9)
Personal history of stroke	184 (83.6)
Diabetes mellitus	171 (77.7)
Hypertension	214 (97.3)
Hyperlipidemia	216 (98.2)
Ischemic heart disease	203 (92.3)
Valvular heart disease	203 (92.3)
Arrhythmias	207 (94.1)
Smoking habits	208 (94.5)
Ethylic habits	207 (94.1)
Diet	206 (93.6)
Obesity	205 (93.2)
Sedentary lifestyle	196 (89.1)
Sleep apnea	120 (54.5)
Cancer	100 (45.5)

n: total number of patients (absolute frequency); %: percentage (relative frequency)

arrhythmias ( $p < 0.001$ ), ischemic heart disease ( $p < 0.001$ ), valvular heart disease ( $p < 0.001$ ), sleep apnea ( $p < 0.001$ ), cancer ( $p = 0.01$ ), smoking and ethylic habits ( $p < 0.001$ ).

Regarding the perception of recurrence, 74% ( $n = 163$ ) of patients believed to be at risk of having a new cerebrovascular event. Even though 85% ( $n = 188$ ) agreed that the CVD risk would decrease by controlling modifiable risk factors, only 66% ( $n = 146$ ) recognized appropriate strategies.

Most patients stated that they were worried about their medical condition (94%,  $n = 207$ ), and 55% ( $n = 121$ ) were highly worried (Likert-type scale).

## Discussion

This investigation depicted a suboptimal knowledge regarding CVD diagnosis, its' risk factors, and the potential of recurrence in hospitalized patients.

One out of four patients of this sample was unaware of their admission diagnosis. The absence of a correct perception of the admission diagnosis leads to ineffective strategies to prevent subsequent events.<sup>7</sup> A possible measure to increase therapeutic adhesion and lifestyle modification could be to correctly state and explain the admission diagnosis to hospitalized patients, taking advantage of the fact that, during this acute stage of the CVD, patients have closer contact with healthcare professionals.<sup>21</sup>

Higher MMSE scores, younger age, and family history of stroke were significantly associated with increased diagnosis awareness. Patients with higher MMSE and younger age probably have higher cognitive performance, leading to a better understanding of their clinical status. On the other hand, patients with family history of CVD were most likely well-informed regarding CVD, due to the impact of this pathology on patients and their families and caregivers.

Less than half of the sample linked CVD to vascular risk factors. Moreover, only 34% of the sample could name at least one risk factor by free recall. This is an issue that demands full consideration as the lack of CVD knowledge presents a primary concern in clinical practice due to its implication on secondary prevention, a fact already exploited by other investigations.<sup>21,22</sup> Male gender, younger age and previous stroke history were significantly associated with the ability to identify stroke risk factors, data in line with Al Shafae and Soto-Cámara *et al* studies.<sup>18,23</sup>

Stroke survivors had higher hit rates of stroke risk factors identification when confronted with a list of possible factors. The most recognized factors were hyperlipidemia, hypertension, smoking and ethylic habits, and cardiac arrhythmias. Regarding hypertension, the high prevalence in our population and the extensive public campaigns and media coverage are probably why patients are well informed regarding its impact on cerebrovascular health.<sup>9,12,14,21,24</sup> A percentage of 98% of our sample identified hyperlipidemia as a risk factor, data compatible with Sloma *et al* investigation.<sup>9</sup> Cardiac pathology was considered a risk factor more often in our population compared to the literature. Soomann M *et al* reported that around 80% of patients was aware that atrial fibrillation was associated with CVD, with a lower percentage for the impact of ischemic heart disease or heart failure (up to 66%).<sup>12</sup> Our sample reported higher values (94.1% and 92.3%, respectively).

In the included sample, 74% of patients believed to be at risk of a new cerebrovascular event. In brief, patients who perceive a higher risk of suffering from CVD comply with prevention practices more likely than those who do not.<sup>6,8</sup> Nevertheless, the overestimation of CVD risk is associated with higher anxiety levels, which can have harmful consequences.

Most of the sample agreed that the risk of new events would decrease by controlling modifiable risk factors. Still, only two-thirds knew how to proceed, data compatible with the literature.<sup>5,25</sup> These findings support the need to explain and promote a lifestyle that decreases the risk of stroke as part of prevention strategies.<sup>25</sup>

The importance of capturing stroke-related knowledge early in the hospital stay is to ensure that educational resources are appropriately used. Patients may be more predisposed to lifestyle changes in the acute phase of a life-threatening disease, so that is the ideal timing for patient education. Poor knowledge of stroke, particularly its risk factors, is the most probable explanation for the persistence of unhealthy lifestyles and mismanagement of risk factors in CVD survivors.

The present study has some limitations. It is a single-center study, despite having an appropriate sample size (according to the sample size calculation). In addition, a possible selection bias cannot be fully streaked due to the exclusion of many patients with severe stroke, language and other cognitive impairments. Also, we highlight that the large number of no image strokes in our sample is probably related to the fact that the questionnaire was performed in the first 72 hours of hospitalization (in which, if necessary, further neuroimaging examinations may not have been performed yet). Another possible limitation is that we used an unvalidated questionnaire. Nevertheless, when recruitment period occurred, there were no validated questionnaires to assess CVD awareness for the Portuguese population. In addition, the questionnaire was applied by two different researchers, that were blinded to sociodemographic and clinical characteristics to prevent

observational biases. Also, the application of a standardized questionnaire avoided interviewer biases. As for the evaluation time, our window was between 12 and 72 hours of hospitalization, according to a study designed for patients with acute CVD and not to lose patients due to early discharges or transfers to other hospitals. We did not evaluate any patients below 12 hours after hospitalization because, even if adequate education was provided, the ability to retain new information could be impaired. Comparing the results of studies using open versus closed questions, it has been suggested that the use of closed questions increases the rate of positive answers and that open questions can underestimate the full knowledge of patients.<sup>5,7,25</sup> In accordance, both open and closed questions were used in our study, improving convergent validity.

Further studies are required to determine the optimal timing, type, environment, and duration of interventions to control vascular risk factors and improve lifestyle after acute CVD.

## Conclusion

This study revealed that knowledge of CVD risk factors is inadequate, despite decades of public campaigns on health promotion and prevention. It is essential to address the multiple risk factors among high-risk patients and stroke survivors to improve their health behaviors.

Campaigns to encourage smoking cessation, reduced salt intake, include physical exercise on the daily-life and to promote a healthy lifestyle should be implemented on a population-based level. Also, early patients' education in

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