

Factors Associated with Delayed Consultation for Stroke in Pointe-Noire (Republic of the Congo)

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Abstract

Background: Stroke prognosis is strongly dependent on early treatment, particularly thrombolysis, which is effective within the first 4.5 hours. **Objective:** To identify factors associated with delayed medical consultation (>3 hours after symptom onset) among stroke patients in Pointe-Noire. **Methods:** A prospective cross-sectional study was conducted from July to October 2024 at the General Hospital of Loandjili. All adult patients (≥ 18 years) with radiologically confirmed stroke were included. Demographic, clinical, and behavioral data were collected. Multivariate logistic regression was performed to identify associated factors. **Results:** Of 151 patients, 66.7% sought consultation after 3 hours. Factors independently associated with delayed consultation included: initial contact with a non-specialized medical provider (adjusted OR = 3.89, $p = 0.026$), nighttime symptom onset (adjusted OR = 2.84, $p = 0.025$), and living ≥ 5 km from the hospital (adjusted OR = 3.97, $p = 0.002$). Protective factors included dizziness (adjusted OR = 0.36, $p = 0.044$) and going directly to the hospital (adjusted OR = 0.39, $p = 0.040$). **Conclusion:** Delayed consultation remains a serious concern and is influenced by geographic, temporal, and behavioral factors. Public awareness campaigns, improved emergency systems, and decentralized care networks are essential to reduce these delays.

Keywords

Stroke, Delayed Consultation, Pointe-Noire, Republic of the Congo

1. Introduction

Stroke represents a major global public health challenge due to its high morbidity, mortality, and long-term socio-economic impact. According to the World Health Organization, stroke is the second leading cause of death worldwide and the leading cause of acquired disability in adults [1] [2]. This situation is particularly critical in resource-limited countries, where access to specialized care is often delayed or unavailable [1].

Rapid intervention, particularly intravenous thrombolysis within the first 4.5 hours, significantly improves the prognosis of ischemic strokes, which account for nearly 85% of cases [3]-[8]. However, many patients in developing countries arrive at the hospital after this optimal treatment window [9]. This delay constitutes a major barrier to effective treatment and compromises both vital and functional outcomes [10]-[15]. In a study conducted in Kinshasa, the delay in hospital arrival increases the risk of severe strokes by 5 times [16].

In Pointe-Noire, the economic capital of the Republic of Congo, no research had yet assessed the determinants of this delay. This study aims to identify the factors associated with the late consultation of stroke victims in order to suggest potential improvements.

2. Methods

We conducted a prospective cross-sectional study from July 1 to October 30, 2024, at the Loandjili General Hospital in Pointe Noire. All patients aged ≥ 18 years admitted for a stroke confirmed by CT or MRI were included. Patients who refused to answer the questionnaire were excluded. Data were collected using a questionnaire administered to the patient or accompanying person and supplemented by a review of medical records. The variables included: consultation delay, (Delayed consultation was defined as arriving at the hospital more than 3 hours after the onset of symptoms. This threshold was chosen to take into account local constraints on access to emergency imaging, so that patients arriving within the first 3 hours still have a reasonable probability of being treated within the maximum recommended window of 4.5 hours for thrombolysis), sociodemographic data, clinical signs, medical history, initial symptom perception, mode of transport, initial contact (The variable "initial contact" was defined as the first person contacted by the patient or their family after the onset of symptoms. It comprised three categories: non-specialized medical staff, family members, and direct consultation at the hospital. For the multivariate analysis, the category "direct consultation at the hospital" was used as the reference category), distance, imaging performed, and outcome. The data were entered into Excel and analyzed using R Studio (version 4.1.3). Qualitative variables were described using frequencies, and quantitative variables were described using means, standard deviations, and extremes. Bivariate comparisons used the chi-squared test for proportions and the Wilcoxon Mann Whitney test for means (significance threshold $\alpha < 0.05$). To limit confounding factors, a multiple binary logistic regression was performed by in-

cluding all variables with a $p < 0.25$ in the initial model. A mixed stepwise automated method was used. The calibration of the multivariate model was verified by the Hosmer Lemeshow test, VIF (variance inflation factors) for multicollinearity, and the AUC of the ROC curve. The study was conducted in accordance with ethics, with permission from the head of the department, anonymity of data, and informed consent from participants.

3. Results

3.1. Descriptive Results

General characteristics out of 190 admitted patients, 151 confirmed cases of stroke were included (79.5%). Ischemic stroke (58.3%) was more frequent than hemorrhagic stroke (41.7%). The average age was 58.9 years (± 12.8) with extremes ranging from 29 to 94 years. Young individuals (under 55 years old) represented 39.7% of the sample. The sex ratio was 1. Patients living more than 5 km from the hospital represented 67%. The average delay before consultation was 28.4 hours (extremes: 1 hour and 336 hours). Only 33.3% of patients arrived within 3 hours.

Clinical aspects: The most frequent symptoms were motor deficit (88.7%) and language disorders (60.9%). Other reasons for consultation are shown in **Figure 1**. These symptoms occurred at night in 29.8% of patients. The average NIHSS score was 9 ± 3 and the average Rankin score at arrival was 3.

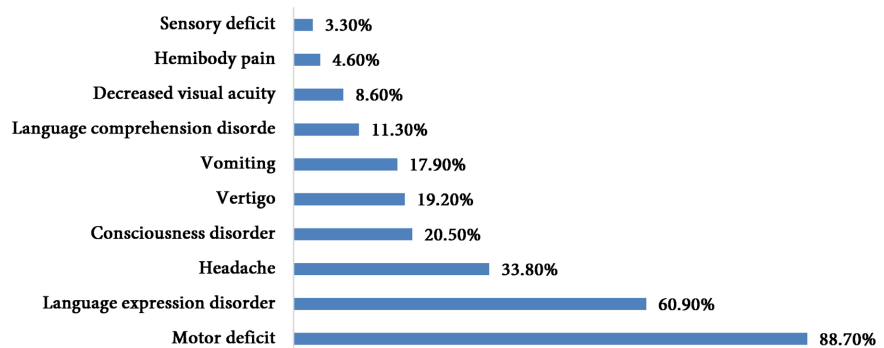


Figure 1. Distribution of patients according to the reasons for consultation.

The delay in consultation was significantly associated with: low socio-economic status ($p = 0.005$), distance between home and the hospital ≥ 5 km ($p = 0.029$), initial contact with a medical agent ($p = 0.048$), occurrence at night ($p = 0.032$). Other factors (age, gender, perception of severity) were not significantly associated with the delay in consultation.

3.2. Multivariate Analysis

The factors independently associated with delay were: Contact with a medical agent: ORa = 3.89; $p = 0.026$. Night occurrence: ORa = 2.84; $p = 0.025$. Distance ≥ 5 km: ORa = 3.97; $p = 0.002$. Protective factors: Direct consultation at the hos-

pital: ORa = 0.39; p = 0.040. Presence of dizziness: ORa = 0.36; p = 0.044. The model was well calibrated (Hosmer-Lemeshow p = 0.89; AUC = 0.795). **Table 1** illustrates the predictive factors for consultation delay after a stroke.

Table 1. Factors associated with the delay in consultation.

Variable	Modality	N	Adjusted odds ratio (IC 95%)	P
Initial contact	Family member	76	Reference	
	Medical worker	31	3.89 (1.25, 14.00)	0.026
	Direct consultation	44	0.39 (0.15, 0.95)	0.040
Time of occurrence	Daytime	106	Reference	
	Night	45	2.84 (1.18, 7.44)	0.025
Socio-economic status	Low	50	Reference	
	High	16	0.30 (0.07, 1.29)	0.104
	Middle	85	0.26 (0.09, 0.65)	0.006
Dizziness	No	121	Reference	
	Yes	30	0.36 (0.13, 0.96)	0.044
Distance from home to the hospital	Below 5 km	50	Reference	
	From 5 km or more	101	3.97 (1.68, 9.98)	0.002

4. Discussion

The results confirm that post-stroke consultation delays are common. This frequency has been widely observed in the literature, where more than three-quarters of patients arrive late at the hospital [16]-[20]. This delay in consultation is defined as arriving at the hospital more than 3 hours after the onset of stroke symptoms [21]. This 3-hour window was chosen considering the difficulties in quickly accessing medical imaging in our reality, which would increase the chances of staying within the 4.5-hour maximum window for thrombolysis.

This delay appears to be a multifactorial phenomenon, involving geographical, temporal, and behavioral determinants. Among the main identified obstacles are the geographical distance between the patient's home and hospital facilities, the occurrence of symptoms at night, as well as inappropriate care pathways which are significant factors of delay. This complexity is widely described in the literature. For example, authors have shown that a lack of awareness of warning signs, hesitation to call emergency services, and underestimation of symptoms by patients or their families are recurring obstacles in the care process [22] [23]. We observe that, unlike in the bivariate analysis, the average socioeconomic level appears to be a protective factor in the multivariate analysis. This difference is probably explained by a confounding effect: once adjusted for distance, initial mode of referral, and time of onset, the socioeconomic level reflects the ability to quickly access hospital services more than social status itself.

The geographical distance ≥ 5 km is a major determinant of delay, as described

in the literature [24].

The initial consultation with a non-specialized healthcare professional extends the care pathway, a well-documented phenomenon [5] [25]-[27]. Thus, the initial reliance on non-specialized health facilities, such as general practice offices or primary care services, significantly contributes to delaying access to specialized emergency services.

The timing of symptom onset is also a well-identified factor. Indeed, nighttime occurrence often delays the recognition of symptoms and access to emergency care. This phenomenon is well described in the literature [6]. Thus, Revathi showed that the time of onset of symptoms between 7 PM and 3 AM was significantly associated with delay in seeking consultation for stroke [26]. Conversely, going directly to the hospital is a protective factor, confirming the importance of immediate orientation. In the literature, patients who arrived early went directly to the hospital [27].

The presence of dizziness, often perceived as alarming, appears to prompt earlier medical consultation. This suggests that the subjective perception of severity relies not only on the classic neurological signs of a stroke but also on less specific manifestations. This observation is in line with the literature [7]. This suggests a lack of awareness of stroke signs among the population. This lack of awareness has been widely described in the literature [8] [28].

These findings highlight the importance of targeted interventions at several levels:

- Awareness campaigns aimed at the general population, to enhance the rapid recognition of early stroke signs and promote an adequate response.
- The development and accessibility of effective emergency regulation platforms, coupled with quickly available medical transportation, especially in rural or peri-urban areas.
- The creation of local neurovascular care centers, aimed at reducing access delays to specialized care.
- Enhanced training for frontline professionals (general practitioners, paramedics, staff at primary care centers) on the rapid detection of strokes and referral to specialized pathways.

Our recommendations stem directly from these results: given that dizziness was associated with earlier consultation, awareness campaigns should include this symptom among the potential signs of stroke. Similarly, the strong association between distance ≥ 5 km and delay justifies the establishment of decentralized care centers or a priority medical transport system.

Limits of the Study

The study is monocentric, which may restrict the generalization of the results to other geographical or organizational contexts. Selection bias is also possible, as only patients who reached the hospital were included. Patients who died before arrival or those who never sought medical attention might have different determinants

of delay, thus limiting the generalizability of the results.

5. Conclusion

Delayed consultation represents a major barrier to effective stroke management in Pointe-Noire. It is associated with geographic, temporal, and behavioral factors. Awareness measures, better organization of the emergency system, and decentralization of care could significantly improve the management and prognosis of strokes.

Authors' Contributions

All authors contributed to the development of this work, including study design, data collection, statistical analysis, writing, review, and editing of the manuscript.

Conflicts of Interest

The authors declare that they have no conflict of interest related to this work.

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