Scientific Research Publishing

World Journal of Neuroscience, 2026, 16(2), 91-103
https://www.scirp.org/journal/wjns
ISSN Online: 2162-2019
ISSN Print: 2162-2000

Prevalence and Prognosis Aspects of Secondary Brain Assets of Systemic Origin after a Cerebral Vascular Accident in Libreville

Raphaël Okoue Ondo[1*], Roselyne Houtsa Temgoua[1], Ghislain Edjo Nkilly[1], Vanessa Sagbo Ada[2], Arsène Ifoudji Makao[3], Ulysse Mayegue Anani[2], Jean Félix Ngomas Moukady[3], Jean Marcel Mandji Lawson[4]

[1]Resuscitation Service, Army Training Hospital Omar Bongo Ondimba, Libreville, Gabon
[2]Anesthesia-Resuscitation-Emergencies Department, Owendo University Hospital, Libreville, Gabon
[3]Anesthesia-Resuscitation-Emergencies Department, Libreville University Hospital Center, Libreville, Gabon
[4]Resuscitation Service, Army Training Hospital of Akanda, Libreville, Gabon
Email: *raphaelokoue@gmail.com

How to cite this paper: Okoue Ondo, R., Houtsa Temgoua, R., Edjo Nkilly, G., Sagbo Ada, V., Ifoudji Makao, A. Mayegue Anani, U., Ngomas Moukady, J.F. and Mandji Lawson, J.M. (2026) Prevalence and Prognosis Aspects of Secondary Brain Assets of Systemic Origin after a Cerebral Vascular Accident in Libreville. *World Journal of Neuroscience*, **16**, 91-103.
https://doi.org/10.4236/wjns.2026.162009

Received: February 3, 2026
Accepted: May 11, 2026
Published: May 14, 2026

Abstract

Stroke is a widespread and serious condition due to its significant impact on morbidity and mortality. This severity is explained not only by the presence of cardiovascular risk factors, but also by the occurrence of Secondary Cerebral Aggressions of Systemic Origin (SCASO), which worsen cerebral ischemia and thus the neurological and functional prognosis of patients. **Objective**: To determine the prevalence of SCASO in the stroke population in the Emergency Departments and Neurology Departments of the University Hospital Center of Libreville (CHUL) and the HIAOBO Hospital. **Patients and Methods**: A prospective, multicenter, longitudinal, analytical study was conducted at CHUL and L'HIAOBO from January to March 2024. The study targeted adult patients hospitalized in the emergency department and neurology or intensive care unit with radiologically confirmed stroke. We collected clinical and paraclinical data (including SCASO) and performed follow-up at days 3, 7, and 30 using the Rankin score to assess neurological prognosis. **Results**: A total of 52 patients were recruited from the two sites. The mean age was 59.5 years, and the male-to-female ratio was 1.4. A history of hypertension was found in 76.9% of patients, 30.8% were alcoholics, and 13.5% were smokers. The prevalence of SCASO was 46.1% and was significantly associated with higher mortality from day 3 ($p = 0.017$) to day 7 ($p = 0.011$). The Rankin score was better in patients with higher mean arterial pressure (MAP) ($p = 0.36$).

Conclusion: The prevalence of SCASO was moderate and underestimated, but showed an association between SCASO and mortality. A larger cohort is needed to demonstrate that its presence significantly influences the vital and functional prognosis of patients.

Keywords

Stroke, Prevalence, SCASO, Prognosis, Libreville

1. Introduction

According to the World Health Organization (WHO), a stroke is "the rapid development of localized or global clinical signs of brain dysfunction with symptoms lasting more than 24 hours that may lead to death, with no apparent cause other than a vascular origin" [1].

This term encompasses very heterogeneous conditions: ischemic strokes (IS), representing 80% to 90% of strokes; intracerebral hemorrhages (ICH) en 10% to 20% of cases; and subarachnoid hemorrhages, which account for less than 2% of strokes and will not be discussed in this paper [2].

The age-standardized incidence of stroke decreased by 12% in high-income countries between 1990 and 2010, while it increased by 12% in low- and middle-income countries [3].

In Africa, stroke accounts for half of all neurology hospitalizations, notably 51.1% in Parakou, Benin [4] and 42.9% in Gabon [5]. Stroke is thus the leading cause of neurology hospitalization, the leading cause of acquired disability in adults, and the second leading cause of death worldwide, and its burden is becoming increasingly heavy in tropical countries [6].

This high prevalence is associated with significant morbidity and mortality, highlighting the severity of this condition. In Gabon, this mortality represented nearly 16% of deaths before the 10th day of hospitalization in a neurology ward, according to Kouna *et al.* [5], and 66% of deaths among patients admitted to intensive care for hemorrhagic stroke, in the study conducted by Bitégué *et al.* [7]. The factors contributing to this mortality were most often modifiable factors such as smoking, obesity, and diabetes. However, aside from the lesion caused by the stroke, patient outcomes are highly dependent on the presence of Secondary Cerebral Aggressions of Systemic Origin (SCASO).

SCASOs are factors that, beyond the initial lesion, can promote the occurrence of cerebral ischemia during the first days of care and worsen the cerebral prognosis of stroke patients [8].

In Gabon, we found little data on the prevalence of SCASOs in the context of neurovascular pathology, as well as their impact on the prognosis of stroke patients. It is with this in mind that we decided to conduct a study aimed at initially evaluating the prevalence of SCASOs and their impact on the vital and functional

prognosis of stroke patients.

2. Patients and Method

2.1. Study Setting

The Libreville University Hospital Center (CHUL) and the Omar Bongo Ondimba Military Teaching Hospital (HIAOBO) were selected as the settings for this study.

The Libreville University Hospital Center is the largest hospital in Gabon and also has the largest neurology department with 20 beds. Furthermore, since November 2021, it has housed the country's only neurovascular unit, with a capacity of 5 beds.

The Omar Bongo Ondimba Military Teaching Hospital is the first military hospital in Gabon. The study was conducted there in the Anesthesia, Intensive Care, and Emergency Department.

2.2. Study Type and Population

This was a prospective, two-center, longitudinal, analytical study conducted over a three-month period, from January to March 2024. The study population consisted of all patients admitted to the emergency departments and/or intensive care units of the two facilities for a stroke documented by imaging: cerebral computed tomography (CT) scan, with or without contrast, and/or magnetic resonance imaging (MRI).

2.3. Inclusion Criteria

All patients with a radiologically confirmed stroke (CT/MRI) and who provided an informed consent form signed by themselves or their family during the study period were included in the study.

Exclusion criteria were: patients without radiological evidence of stroke, those under 18 years of age, and pregnant women. Patients lost to follow-up before day 7 and/or who withdrew from the study were excluded.

2.4. Methodology

Patients were selected in the emergency departments of hospitals, through the physicians who received them. After a definitive diagnosis by imaging, the study was explained to the patient if they were conscious, or to the accompanying family member. After agreeing to participate, they were asked to read and sign the informed consent form. Once informed consent was obtained, the patient was recruited and assigned a unique identifier. They were then followed up on days 3, 7, and 30, either at the hospital or by telephone if they had been discharged.

The Case Report Form (CRF) collected:

- Socio-demographic data: age, sex, place of residence, socioeconomic status;

- Anamnestic and clinical data: timing of symptoms, initial manifestation, type of transport, time between symptom onset and medical intervention, Glasgow Coma Scale score on admission, clinical examination on admission, initial man-

agement, initial presence of SCASOs (arterial and systemic symptoms of cardiovascular disease), and their potential time to onset (hypotension, hypoxia, hypocapnia, hypercapnia, anemia, hypoglycemia, hyperglycemia, hyponatremia, hyponatremia, hyperthermia, dyskalemia); medical history (hypertension, diabetes, arrhythmias, chronic renal failure, stroke, alcohol consumption, tobacco use).

- Paraclinical datas: CT scan results (time of scan, type of stroke, severity indicators).

- Follow-up assessment: at day 30, discharge status: deceased or alive, length of stay, functional prognosis (Rankin score).

SCASOs were defined as follows:

- Hypotension: Systolic blood pressure < 90 mmHg ;
- Hypoxia: PaO_2 < 60 mmHg or $SaPO_2$ < 92%;
- Hypocapnia: $PaCO_2$ <35 mmHg;
- Anemia: Hemoglobin < 10 g/dL;
- Hypoglycemia: Blood glucose < 4.5 mmol/L;
- Hyperglycemia: Blood glucose > 10 mmol/L;
- Hyponatremia: Blood sodium < 130 mmol/L;
- Hyperthermia: Temperature > 38.4˚C.

Missing data will not be eliminated if it remains below 5% of the cohort. Otherwise, the discussion will focus on the median value of the variable being studied.

The data obtained from the CRF were entered into Excel© (Microsoft Office© 2021). The data were then imported into R© software, which was used for statistical analyses. Quantitative variables are presented as arithmetic mean and standard deviation, or median and interquartile range. Qualitative variables are presented as count (n) and percentage (%). The Chi-square test and Yates' test were used to verify the association between categorical variables. The significance level was set at $p = 0.05$.

2.5. Ethical Considerations

Participants and/or their companions signed an informed consent form before any procedure related to this study. The study was conducted according to the principles of Good Clinical Practice (GCP) of the International Conference on Harmonisation (ICH) and the Declaration of Helsinki. In the absence of an institutional ethics committee in the two hospital settings of the study, we received authorization from the General Management of the hospitals involved in the study, and from the heads of the neurology, intensive care, and emergency departments.

3. Results

A total of 72 patients comprised the study population. Twenty of them were excluded after refusing to sign the informed consent form. Fifty-two (52) patients were therefore included in the study.

The patients had a mean age of 59 years, and among them, thirty were women,

representing a male-to-female ratio of 0.7.

The strokes admitted occurred day or night in 46.2% of cases, and 44.2% of them occurred within 4 hours and 30 minutes. The means of transport to the hospital was non-medical in 88.5% of cases.

Of the 52 patients included, 18 had a hemorrhagic stroke and 34 had an ischemic stroke. Fourteen patients had an initial Glasgow Coma Scale score of 12 or less, Radiological findings on brain scans showed ventricular hemorrhage in 7 cases and midline deviation in 3.

Nearly 80% (76.9%, n = 40/52) of the patients had hypertension, and 25% of them had a history of stroke. Among the 52 patients included, 40 had a medical history of hypertension, with 22.5% of hypertensive patients having regular blood pressure monitoring. Regarding diabetics, only 42.9% regularly saw their primary care physician.

At admission, motor deficits, speech disorders, and altered consciousness were the most frequent signs, affecting 57%, 18%, and 12% of the patient population, respectively. Assessment of level of consciousness at admission revealed a Glasgow Coma Scale (GCS) score of 12 or higher in 71% of patients. The mean systolic blood pressure (SBP) was 169 mmHg and the mean diastolic blood pressure (DBP) was 97.2 mmHg. The mean MAP was 120 mmHg. Grade 3 hypertension was found in 16 patients (Table 1).

Table 1. Distribution according to blood pressure and Glasgow Coma Scale (GCS).

Variable		Value (n)	Standard deviation	Extremes
SBP	Mean (SD)	169	38.3	
	Median [Min, Max]	174		[76.0, 242]
DBP	Mean (SD)	97.2	28.1	
	Median [Min, Max]	93.0		[43.0, 170]
	Missing	1		
MAP	Mean (SD)	120	31.3	
	Median [Min, Max]	117		[56.0, 194]
GSC	Mean (SD)	13.2	2.82	
	Median [Min, Max]	15.0		[4.00, 15.0]

3.1. Prevalence of SCASOs

During the study, the prevalence of SCASOs was 46.1% (n = 24/52). In the first 24 hours, 19 patients (36.5%) presented with SCASOs, compared to 12 (23%) on day 3 and 7 (13.4%) on day 7.

3.1.1. Prevalence in the First 24 Hours

During the first 24 hours, the most common SCASOs was hyperglycemia and the least common was hypotension (n = 18). Hypoxia was also found in 36.1% of patients.

3.1.2. Prevalence at Day 7

The predominant adverse event at Day 7 was hyperthermia (n = 4, or 57.1%). Hypotension was present in 2 patients

3.1.3. Persistence of SCASOs

The presence or absence of SCASOs is summarized in Table 2. Hypotension was rare (5.3%) in the first 24 hours of care, while hypoxia was more frequent (31.6%). At Day 3, hypotension was absent, but hypoxia persisted in 25% of cases. At Day 7, 28.6% of patients were still hypotensive (Table 2).

Table 2. Distribution of the SCASO's prevalence according to the length of stay.

Variable		1st 24 h	Day 3	Day 7
		(n = 19)	(n = 12)	(n = 7)
Hypotension	Absent	18 (94.7%)	12 (100%)	4 (57.1%)
	Present	1 (5.3%)	-	2 (28.6%)
Hypoxia	Absent	13 (68.4%)	6 (50.0%)	4 (57.1%)
	Present	6 (31.6%)	3 (25.0%)	-
Hypocapnia	Absent	2 (10.5%)	2 (16.7%)	-
	Not screened	17 (89.5%)	9 (75.0%)	7 (100%)
Hypercapnia	Absent	1 (5.3%)	-	1 (14.3%)
	Present	1 (5.3%)	2 (16.7%)	-
	Not screened	17 (89.5%)	10 (83.3%)	6 (85.7%)
Hypoglycemia	Absent	15 (78.9%)	6 (50.0%)	4 (57.1%)
	Present	4 (21.1%)	2 (16.7%)	-
Hyperglycemia	Absent	10 (52.6%)	3 (25.0%)	1 (14.3%)
	Present	9 (47.4%)	3 (25.0%)	3 (42.9%)
Hyponatremia	Absent	17 (89.5%)	5 (41.7%)	3 (42.9%)
	Present	1 (5.3%)	2 (16.7%)	1 (14.3%)
	Not screened	1 (5.3%)	5 (41.7%)	3 (42.9%)
Hyperthermia	Absent	10 (52.6%)	3 (25.0%)	2 (28.6%)
	Present	6 (31.6%)	5 (41.7%)	4 (57.1%)
	Not screened	3 (15.8%)	4 (33.3%)	1 (14.3%)
Anemia	Absent	11 (57.9%)	4 (33.3%)	3 (42.9%)
	Present	8 (42.1%)	1 (8.3%)	1 (14.3%)

3.1.4. Outcome of SCASOs

Regarding patient outcomes, 16 (31%) had died by Day 30. The mean length of stay was 7 days. The initial Glasgow Coma Scale (GCS) score was significantly lower at admission in those who died. However, no significant difference was noted between survivors and those who died on the PAM at admission.

Regarding the persistence of SCASOs, they were more frequently found over time in the deceased population than in the survivors.

3.1.5. SACOs and Mortality

From a general perspective, the presence of one or more SCASOs was not a prognostic factor for death after statistical analysis. This characteristic was observed in the early phase (less than 24 hours of care), with no correlation to immediate or delayed death. However, a statistically significant correlation existed between the persistence of one or more SCASOs on days 3 and 7 and the occurrence of death.

All patients presenting with hypotension upon admission (n = 4) died. Three of them died within the first 24 hours of care.

3.1.6. SCASOs and Neurological Sequelae

For the 36 survivors at day 30, we were not statistically able to demonstrate a correlation between the prevalence of SCASOs and functional prognosis, although a trend seemed to emerge, between a higher Mean Arterial Pressure and the Rankin Scale score approaching 1.

4. Discussion

4.1. Socio-Demographic Data

In the study, the most represented age group was 50 to 64 years. The study population is young, and this result is comparable to that found by Kouna *et al.* [5] and Okoué *et al.* [9]. This can be explained by the youthfulness of the population in sub-Saharan Africa. The mean age was 58.2 years in the study by Adoukonou *et al.* [4], and 57.6 ± 11.7 years in the study by Kouna *et al.* [5], but different from that found in Tunisia by Moalla *et al.* (68.45 ± 13.97) [10] where, as in Europe, the population is aging [11].

Furthermore, women represented 57.7% of the sample, comparable to the data from Kouna *et al.* who found 56.2% women [5].

Patients arrived at the hospital both day and night (46.2%). In the studies by Okoué *et al.* and Moalla *et al.*, we found a consultation delay of less than 4.5 hours in 47.82% and 48% of cases, respectively [9] [10]. In Conakry, this delay affected only 8% of patients and was justified by the mode of transport, prior knowledge of the stroke, the young age of the patient, and care provided by the family [12].

Consultation times were therefore quite rapid and should have allowed for the diagnosis and early hospital management of acute coronary syndrome, with most cases disappearing within the first 24 hours, which was not observed in this study.

In this study, patients arrived at the hospital primarily using their own transportation (88.5%), as in Senegal where Sene-Diouf *et al.* No patients who had received medical transport were found [13], a result corroborated by Okoué *et al.* [9], and confirmed by the results obtained by Ibogni in Libreville in 2022 [14]. In developed countries, however, specific management measures are in place to rap-

idly treat patients [15]-[17]. Indeed, early intervention during the "golden hour" SACOs, particularly in the prehospital setting, has been shown to improve the prognosis [8] [18].

The absence of prehospital intervention delays the diagnosis and/or treatment of SCASOs. Adequate prehospital management limits the adverse effects of SCASOs and its impact on neurological and vital prognosis.

4.2. Clinical Data

Hypertension is the most frequently observed risk factor in stroke patients. The relationship between blood pressure and stroke risk exists even at blood pressure values of 111/75 mmHg in the study conducted by Béjot *et al.* [2]. Elevated blood pressure and its poor management remain the leading cause of stroke, as also reported by Ibogni and Essola *et al.* in Gabon, and by Adoukounou *et al.* and Sene-Diouf *et al.* in Benin and Senegal, respectively [4] [13]. In developed countries, it accounts for one-third of the modifiable risk factors for stroke [19]. There, too, arteriovenous malformations will manifest as a stroke in more than 60% of cases [20].

The presence of hypertension is therefore common in stroke and, according to some authors, appears to help maintain adequate cerebral perfusion pressure.

Optimal mean arterial pressure (MAP) would be ≥90 mmHg. In the study, this was the case for 83% of patients.

However, 17% of them had a MAP < 90 mmHg, even in the absence of hypotension. Hypotension (systolic blood pressure ≤ 90 mmHg) is a particularly harmful comorbidity and occlusion, and must be detected and treated promptly. However, in neuro-intensive care, a MAP ≤ 90 mmHg should be considered with the same rigor in order to improve neurological, vital, and functional prognosis.

The first manifestation of stroke was motor deficit. This result is consistent with the literature, as reported by Ibogni *et al.*, Okoué *et al.*, Kouna *et al.* in Gabon, and also by Adoukonou *et al.* [4] [5] [14]. The level of consciousness on admission was comparable to that found in Africa by Moalla *et al.* and Adoukonou *et al.*, in whom the mean GSC was 13.96 and 13.2, respectively [4] [10].

Blood pressure was most often normal (n = 23/52), which is explained by the fact that most strokes were ischemic, as found by Okoué *et al.* [9]. This result is the same in the studies by Moalla *et al.* in a North African population, with mean systolic and diastolic blood pressures of 144 mmHg and 82 mmHg, respectively [10]. However, maintaining a mean arterial pressure (MAP) above 90 mmHg is necessary to ensure a better prognosis. We found that 83% of patients had a mean arterial pressure (MAP) greater than 90 mmHg, which is normal given that stroke is a common condition in hypertensive individuals, with a mean systolic blood pressure (SBP) that was high (165 mmHg). This result is comparable to that found by Moalla *et al.*, where the mean SBP was 148.86 mmHg.

As previously mentioned, although hypotension is unanimously recognized as detrimental, MAP monitoring should be a key aspect of stroke patient management.

4.3. SCASOs

4.3.1. Prevalence SCASOs

During the study, the prevalence of SCASOs was 46.1% (n = 24/52): This was significantly lower than that found by Bengono *et al.* in studies on stroke in Cameroon, which reported 81% of cases [11].

In the first 24 hours, no patients presented with hypotension, as stroke is a condition associated with hypertension. However, there were many more patients presenting with hypoxia (n = 13/52), likely related to central respiratory distress, and 10% presented with a deep coma. Hyperglycemia was the most common adverse event associated with diabetes as central nervous system activity on the pancreas leads to increased insulin secretion, inducing hyperglycemia, which is already present in some diabetic patients [1].

In Tunisia, hyperglycemia was observed in 103 cases (51.50%), of which 36 (34.95%) were not known to have diabetes [10], highlighting the importance of early, and particularly pre-hospital, management of glycemic imbalance [8] [21] [22].

On day 7, hypoxia was absent among the persistent SCASOs, while hypotension was present in two of the seven remaining cases. The presence of hypotension may be linked to poor initial blood pressure management, iatrogenic hypotension due to misuse of antihypertensive drugs, or clinical deterioration of the patient during treatment (central dysautonomia, healthcare-associated sepsis, etc.). Hypoxia correction is simpler in the absence of impaired pulmonary gas exchange, hence the expected and observed short-term resolution. The persistence of SCASOs is not normal, as much of the management revolves around their prevention. This again reflects inadequate management or, in extreme cases, the natural progression of truly critically ill patients [8] [15] [23] [24].

4.3.2. Persistence of SCASOs over Time

SCASOs persists over time in patients admitted to referral hospitals, including the country's only stroke unit. This is difficult to understand, as SCASOs prevention is one of the cornerstones of neuro-intensive care.

This anomaly could be explained by: insufficient diagnostic and management resources (lack of ventilators, blood gas analysis, routine laboratory testing, etc.), and the need for further research on the adverse effects on prognosis, which are usually underestimated by healthcare professionals. For example, at the University Hospital of Libreville, where blood gas analysis was available, it was requested for only one patient. This suggests a possible neglect of hypoxia and/or capnia monitoring, two of the most harmful SCASOs for an injured brain.

Regarding the recurrence of acute chronic obstructive pulmonary disease, it likely occurs due to complications related to resuscitation difficulties (care-associated pneumonia in intubated patients, other nosocomial infections, and their consequences). Preventing these care-related complications would significantly reduce the occurrence and/or persistence of certain SCASOs and consequently improve the prognosis for these patients.

4.3.3. Patient Progression Profile with SCASOs at Day 30

Among the patients with SCASOs, 7 died (33.3%), a result similar to that reported by Mathieu-Blondet *et al.* in France [16]. The average length of stay for these patients was 7 days, less than the 11.6 days reported by Kouna *et al.* [5]. This could be explained by more severe initial lesions, whether or not associated with the occurrence of SCASOs. Primary lesions, which remain the main factor determining prognosis, could explain this disparity, in addition to the small size of our sample.

4.4. Prognostic Aspects of SCASOs

Generally speaking, in the study, no correlation was found between the occurrence of SCASOs and an unfavorable prognosis after statistical analysis.

This is probably because the prognosis depends primarily on the primary lesion and its anatomical size. In the study, we were unable to obtain descriptions of the lesions. For example, the ICH score could not be recorded, as the volume of hematomas is not routinely measured by radiologists.

A univariate analysis, on a larger cohort, would likely have shown that the volumes of ischemia/hemorrhage would have a greater influence on prognosis than the presence or absence of SCASOs.

4.4.1. SCASOs and Mortality

Regarding the early phase, there was no significant association between the presence of SCASOs and the occurrence of death: clinical manifestations and severity are strictly linked to the primary lesion, and the adverse effects of SCASOs are not as early. The effect of SCASOs on the severity of intracranial hypertension appears to be later, hence the significance for deaths from day 3 onwards. However, complications specific to the pathology and the environment must not be overlooked.

Arterial hypotension is the most serious SCASOs [22]. This has been clearly demonstrated, especially in head trauma, but can undoubtedly be extrapolated to strokes. In our cohort, all hypotensive patients died.

4.4.2. SCASOs and Functional Outcome

For the 36 survivors at day 30, we observed that the higher the MAP (Mean Arterial Pressure), the closer the Rankin Scale score (RSC) was to 1, but this association was not statistically significant ($p = 0.36$). It seems logical that the lower the SCASOs score, the better the functional outcome. A larger study would confirm this and clarify the various correlations studied.

4.5. Limitations of This Study

This study had several limitations:

- The short inclusion time, which did not allow us to obtain a larger and therefore more representative cohort;
- The unavailability of blood gas analysis at HIAOBO and missing data (unresearched parameters, lack of comprehensive monitoring);

• The disparity in care protocols between HIAOBO and CHUL, which had different impacts on patient mortality.

However, it had certain strengths, namely:

• The prospective nature of the study, which facilitates the review and reform of public health policies;

• The study is bicenter and includes a referral center (which has the only stroke unit in the country).

5. Conclusions

The objective of this study was to determine the prevalence of stroke-related adverse events in the stroke population in the Emergency and Neurology departments of 2 of the biggest hospital in Gabon. SCASOs are factors that promote the occurrence of cerebral ischemia during the first days of care for stroke patients and worsen the neurological prognosis. Their diagnosis relies on simple measures, and their management is codified. Therefore, their occurrence and persistence should no longer be observed once the brain-injured patient crosses the threshold of the hospital.

Several studies have described a high prevalence of SCASOs and their impact on vital and functional prognosis. Knowledge of this information could help health policies in terms of awareness, management, and follow-up, as well as continuing education for staff involved in this care.

The prevalence of SCASOs in this study was moderately high but probably underestimated. Mortality was higher in patients with SCASOs from day 3 onward. The fewer SCASOs a patient had (MAP > 90 mmHg in this case), the better their functional prognosis.

This supports the importance of early management of these factors. However, our sample size is insufficient to definitively establish this in the Gabonese population. A new study, with greater statistical power, will undoubtedly be necessary to confirm this and to highlight it to those involved in the care of patients suffering from of stroke the imperative need for screening and management of SCASOs.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Balch, M.H.H., Nimjee, S.M., Rink, C. and Hannawi, Y. (2020) Beyond the Brain: The Systemic Pathophysiological Response to Acute Ischemic Stroke. *Journal of Stroke*, **22**, 159-172. https://doi.org/10.5853/jos.2019.02978

[2] Béjot, Y., Touzé, E., Jacquin, A., Giroud, M. and Mas, J. (2009) Épidémiologie des accidents vasculaires cérébraux. *Médecine/Sciences*, **25**, 727-732. https://doi.org/10.1051/medsci/2009258-9727

[3] Feigin, V.L., Forouzanfar, M.H., Krishnamurthi, R., Mensah, G.A., Connor, M., Bennett, D.A., *et al.* (2014) Global and regional Burden of Stroke during 1990-2010: Findings from the Global Burden of Disease Study 2010. *The Lancet*, **383**, 245-254.

https://pubmed.ncbi.nlm.nih.gov/24449944/

[4] Adoukonou, T., Agbétou, M., Sowanou, A., Kossi, O., Fotso, P., Houéhanou, C., *et al.* (2020) Stroke Care and Outcomes in the Department of Neurology in Parakou, Benin: Retrospective Cohort Study. *Annals of Medicine and Surgery*, **57**, 148-152. https://doi.org/10.1016/j.amsu.2020.07.041

[5] Philomène, K.N., Athanase, M., De Paul, S.K.F. and Yvonne, A.-Z. (2007) Aspects epidémiologiques et evolutifs des accidents vasculaires au centre hospitalier de libreville (Gabon). *African Journal of Neurological Sciences*, **26**, 122-130.

[6] Lopez, A.D., Mathers, C.D., Ezzati, M., Jamison, D.T. and Murray, C.J. (2006) Global Burden of Disease and Risk Factors. The International Bank for Reconstruction and Development/The World Bank and Oxford University Press.

[7] Bitégué, L., Essola, L., Gnigone, P., Ifoudji, A., Manga, F., Ngomas, J.F., *et al.* (2022) Aspects épidémiologiques et thérapeutiques des accidents vasculaires cérébraux hémorragiques dans l'unité de réanimation du centre hospitalier universitaire de libreville. *Health Sciences and Disease*, **23**, 90-94.

[8] Bongiorno, B. (2019) Prévention des ACSOS: concepts physiologiques et mise en pratique infirmière. *Médecine Intensive Réanimation*, **28**, 408-413. https://doi.org/10.3166/rea-2019-0105

[9] Okoué Ondo, R., Edjo Nkilly, G., Mayegue, U., Djoko II, S., Oliveira, S., Sougou E., *et al.* (2020) Profile of Patients with Stroke Admitted in Military Teaching Hospital in Gabon. *International Journal of Development Research*, **10**, 39302-39306.

[10] Moalla, K.S., Damak, M., Chakroun, O., Farhat, N., Sakka, S., Hdiji, O., *et al.* (2020) Facteurs pronostiques de mortalité par accident vasculaire cérébral artériel à la phase aiguë dans une population nord-africaine. *Pan African Medical Journal*, **35**, Article No. 50. https://doi.org/10.11604/pamj.2020.35.50.16287

[11] Bengono Bengono, R.S., Amengle, A.L., Ndikontar, R., Kona Ngondo, S., Gouag, Iroume, C., *et al.* (2023) Aspects cliniques et pronostiques des accidents vas-culaires cérébraux en réanimation au cameroun. *Health Sciences and Disease*, **24**, 1-5 https://www.hsd-fmsb.org/index.php/hsd/article/view/4263

[12] Abass Cisse, F., Soumah, E., Camara, B., Lamine Toure, M., Djigué Barry, S. and Cisse, A. (2016) Délai de consultation après AVC et les facteurs associés au CHU Ignace Deen de Conakry. *Revue Neurologique*, **172**, A63. https://doi.org/10.1016/j.neurol.2016.01.148

[13] Sene-Diouf, F., Basse, A.M., Ndiaye, M., Toure, K., Diop, M.S., Thiam, A., *et al.* (2007) Prise en charge des accidents vasculaires cérébraux au Sénégal. *Revue Neurologique*, **163**, 823-827. https://doi.org/10.1016/s0035-3787(07)91465-4

[14] Ibogni Rembo, C.D. (2023) Prise en charge et pronostic des accidents vasculaire cérébraux à Libreville. Thèse de Médecine, Université des Sciences de la Santé (USS) de Libreville.

[15] Carrel, M., Moeschler, O., Ravussin, P., Favre, J. and Boulard, G. (1994) Médicalisation préhospitalière héliportée et agressions cérébrales secondaires d'origine systémique chez les traumatisés craniocérébraux graves. *Annales Françaises d'Anesthésie et de Réanimation*, **13**, 326-335. https://doi.org/10.1016/s0750-7658(94)80041-3

[16] Mathieu-Blondet, A., Malet, A., Devy, R., Causeret, M., Rouquette, A. and Fanello, S. (2009) Évaluation de la prise en charge des patients atteints d'accident vasculaire cérébral (AVC) dans un centre hospitalier. *Santé Publique*, **20**, 561-574. https://doi.org/10.3917/spub.086.0561

[17] Daubail, B., Legris, N., Serradj, D., Honnart, D., *et al.* (2016) Prise en charge des accidents vasculaires cérébraux en urgence. EM-Consulte.

https://www.em-consulte.com/article/1133236/prise-en-charge-des-accidents-vas-culaires-cerebrau

[18] Zamour, C. (2013) Accident vasculaire cérébral: Faut-il prendre en charge les ACSOS en structure d'urgence? In: Elsevier-Masson, Ed., *Ouvrage "Urgences* 2013", *Société Française de Médecine d'Urgence*, 1-16

[19] Diener, H. and Hankey, G.J. (2020) Primary and Secondary Prevention of Ischemic Stroke and Cerebral Hemorrhage. *Journal of the American College of Cardiology*, **75**, 1804-1818. https://doi.org/10.1016/j.jacc.2019.12.072

[20] Meyer, P.G. and Brunelle, F. (2006) Malformations artérioveineuses cérébrales de l'enfant. *EMC—Pédiatrie-Maladies Infectieuses*, **1**, 1-8. https://doi.org/10.1016/s1637-5017(06)74522-7

[21] Daubail, B., Legris, N., Serradj, D., Honnart, D., Tissier, C., Freysz, M., *et al.* (2016) Prise en charge des accidents vasculaires cérébraux en urgence. *EM-Consulte Médecine d'urgence*, **11**, 1-13.

[22] Thy, M., Sonneville, R., Ruckly, S., Dupuis, C., Poujade, J., Bouadma, L., *et al.* (2023) Impact des agressions cérébrales secondaires d'origine systémique sur le pronostic à court terme des patients en réanimation atteints d'encéphalopathie associée au sepsis. *Médecine et Maladies Infectieuses Formation*, **2**, S6-S7. https://doi.org/10.1016/j.mmifmc.2023.03.021

[23] Freysz, M., Lenfant, F., Kamp, E. and Giroud, M. (2002) Prise en charge préhospitalière, filière de soins. L'accident vasculaire cérébral en phase préhospitalière.

[24] Turc, G., Hadziahmetovic, M. and Vivien, B. (2020) Prise en charge préhospi-talière des accidents vasculaires cérébraux. *La Revue du Praticien*, **70**, 617.