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## **MONITORING IN THE EARLY DETECTION OF SECONDARY LESION AFTER ISCHEMIC STROKE: CASE REPORT**

## **A MONITORIZAÇÃO NA DETEÇÃO PRECOCE DE LESÃO SECUNDÁRIA APÓS AVC ISQUÉMICO: RELATO DE CASO**

## **SEGUIMIENTO EN LA DETECCIÓN PRECOZ DE LA LESIÓN SECUNDARIA TRAS ICTUS ISQUÉMICO: REPORTE DE UN CASO**

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## ABSTRACT

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**Objective:** To analyze the clinical case of a patient with stroke in the light of the available literature, taking into account the elaboration of a proposal for a nursing care plan, focusing on Hypertension, Paresis and Sensory Aphasia.

**Method:** Case study of a 74-year-old patient with motor deficits and confusion with 16 hours of evolution, personal history of hypertension. For initial evaluation and data collection, the theoretical model of Activities of Living by Nancy Roper & Tierney and ICNP taxonomy were used to carry out the nursing care plan. The electronic databases were selected through the Bibliographic Catalogue Portal of the University of Évora, the EBSCO Online Knowledge Library (B-On) and databases PubMed, SCieLO, Scopus and Google Scholar. The research was developed in order to identify a pattern in the provision of care to the patient in this clinical situation, in order to elaborate a care plan.

**Results/Discussion:** From the initial evaluation, 14 nursing diagnoses were identified, of which the main ones were: Hypertension, Paresis and Sensory Aphasia. One of the main focuses of stroke prevention remains the identification of the most likely etiology of stroke and the development of a personalized care plan.

**Conclusion:** The measurement of post-stroke deficits and the implementation of an activity plan allows the level of dependence of the user to be recorded, so that it is easy to identify changes to this level of dependence, which, if increased, may mean the occurrence of a secondary injury.

**Keywords:** Ischemic Stroke; Hemorrhagic Stroke; Monitoring; Nursing Care.

## RESUMO

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**Objetivo:** Analisar o caso clínico de um doente com acidente vascular cerebral face à literatura disponível, tendo em conta a elaboração de uma proposta de um processo de cuidados de enfermagem, com enfoque na Hipertensão, Parésia e Afasia Sensorial.

**Método:** Estudo de caso referente a um doente de 74 anos com défices motores e confusão com 16h de evolução, antecedentes pessoais de hipertensão. Para avaliação inicial e colheita de dados foi utilizado o modelo teórico das Atividades de Vida Diária de Nancy Roper & Tierney e taxonomia CIPE para realização do processo de cuidados de enfermagem. As bases de dados eletrónicas foram selecionadas através do Portal do Catálogo Bibliográfico da Universidade de Évora, da Biblioteca de Conhecimento Online (B-On) da EBSCO e bases de dados PubMed, SCieLO, Scopus e Google Académico. A pesquisa foi desenvolvida de forma a identificar um padrão na prestação de cuidados ao utente nesta situação clínica, com vista

a elaborar um processo de cuidados.

**Resultados/Discussão:** A partir da avaliação inicial identificaram-se 14 diagnósticos de enfermagem, dos quais se destacaram como principais: Hipertensão, Paresia presente e Afasia Sensorial. Um dos focos principais da prevenção de AVC mantém-se na identificação da mais provável etiologia do mesmo e desenvolvimento de um plano de cuidados personalizado.

**Conclusão:** A mensuração dos défices pós-AVC e a implementação de um plano de atividades permite registar o nível de dependência do utente, para que seja fácil a identificação de alterações a esta dependência, que caso seja aumentada, poderá significar a ocorrência de uma lesão secundária.

**Palavras-chave:** AVC Isquémico; AVC Hemorrágico; Cuidados de Enfermagem; Monitorização.

## RESUMEN

**Objetivo:** Analizar el caso clínico de un paciente con accidente cerebrovascular a la luz de la literatura disponible, teniendo en cuenta la elaboración de una propuesta para un plan de atención de enfermería, centrándose en la hipertensión, la paresia y la afasia sensorial.

**Método:** Estudio de caso de un paciente de 74 años con déficits motores y confusión con 16 horas de evolución, antecedentes personales de hipertensión. Para la evaluación inicial y la recopilación de datos, se utilizaron el modelo teórico de Actividades de Vida de Nancy Roper & Tierney y la taxonomía de la CIPE para llevar a cabo el plan de atención de enfermería. Las bases de datos electrónicas fueron seleccionadas a través del Portal del Catálogo Bibliográfico de la Universidad de Évora, la Biblioteca en Línea de Conocimientos de EBSCO (B-On) y las bases de datos PubMed, SciELO, Scopus y Google Scholar. La investigación se desarrolló con el fin de identificar un patrón en la prestación de atención al paciente en esta situación clínica, con el objetivo de elaborar un plan de atención.

**Resultados/Discusión:** A partir de la evaluación inicial, se identificaron 14 diagnósticos de enfermería, de los cuales los principales fueron: hipertensión, paresia y afasia sensorial. Uno de los principales enfoques para la prevención del accidente cerebrovascular sigue siendo la identificación de la etiología más probable del accidente cerebrovascular y el desarrollo de un plan de atención personalizado.

**Conclusión:** La medición de los déficits post-accidente cerebrovascular y la implementación de un plan de actividad permiten registrar el nivel de dependencia del usuario, de modo que sea fácil identificar cambios en este nivel de dependencia, que, si aumentan, pueden significar la ocurrencia de una lesión secundaria.

**Descriptor:** Accidente Cerebrovascular Isquémico; Accidente Cerebrovascular Hemorrágico; Atención de Enfermería; Monitoreo.

## INTRODUCTION

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The choice of the theme for this case study is based on the approach of nursing care in the early detection of secondary injury after cerebrovascular accident (CVA), since it is one of the greatest causes of dependence and disability of people worldwide<sup>(1)</sup>. The World Health Organisation (WHO) report states that the main chronic diseases are related to the cardiovascular system, cancer, diabetes and respiratory diseases, thus affecting the quality of life of the person/family/significant other, in addition to the socio-economic impact, as well as the burden on health systems<sup>(1)</sup>. Stroke is a neurological manifestation of a brain injury and is one of the leading causes of death and hospitalization in the world. In Portugal, the incidence of stroke is one of the highest in Europe, being the main cause of death in the country, about 11 thousand deaths per year<sup>(2)</sup>. In recent decades, there has been an exponential increase in the average life expectancy of the world population and, consequently, an increase in morbidity, with cerebrovascular diseases, such as stroke, being one of the most prevalent pathologies<sup>(3)</sup>. It is classified according to its etiology as ischemic and hemorrhagic, the former being the most common with 87% of cases. The symptoms attributed to this type of stroke are related to the inadequate supply of blood and oxygen to brain cells following an interruption in blood flow due to an obstruction of an artery<sup>(4)</sup>. Hemorrhagic stroke occurs due to rupture of a cerebral blood vessel, causing extravasation of blood into the intracerebral or subarachnoid space.

This type of disease is increasingly monitored by nurses, and early detection allows for adequate care, minimizing secondary injuries. Thus, considering the determining time factor, the early recognition of the signs and symptoms “difficulty in speaking”, “mouth to the side” and “lack of strength of a limb”, should be as timely as possible, through the activation of the Stroke Pathway (VVAVC – Via Verde Acidente Vascular Cerebral), either in the out-of-hospital environment, by a 112 call to INEM (Portugal’s National Institute for Medical Emergency), or in-hospital, by the defined circuits. According to INEM data, in 2022, 6876 calls for suspected stroke were answered and referred to VVAVC hospitals<sup>(5)</sup>.

According to the guidelines of the American Stroke Association and following the norm of the National Health Service of Portugal, nursing care for stroke victims should be as done early as possible according to an ABCDE approach, collection of information on the exact time of onset of symptoms, circumstances and a neurological examination with the evaluation of the National Institutes Health Stroke Scale (NIHSS). followed later by an imaging examination – Computed Axial Tomography (CT) and/or Cerebral Angio TAC<sup>(6)</sup>.

Ischemic stroke is considered a medical emergency that, if not treated in a timely manner, will cause serious physical sequelae. Thus, the acute phase of treatment consists of: venous thrombolysis, performed up to 4:30h from the onset of symptoms, in which a thrombolytic drug is administered with the aim of thrombus lysis and subsequent reperfusion; and endovascular thrombectomy in patients with occlusion of the great cerebral arteries by catheterization, that may be performed up to 6 hours after the beginning of the event. This procedure allows you to minimize brain damage, improve reperfusion rates, and reduce the risk of intracranial hemorrhage<sup>(7)</sup>. One of the most common complications in ischemic stroke after thrombolysis is the transformation of the stroke into a hemorrhagic stroke, hence the importance of monitoring and surveillance of the person by trained nursing teams.

“Time continues to be the brain, it is essential that scientific progress and the organization of care be maintained in a disease as prevalent and potentially serious as stroke”<sup>(8)</sup>.

In light of the above, this article aims to develop a proposal for a care plan within the scope of the early detection of secondary injury through the rigorous monitoring of the person diagnosed with ischemic stroke, focusing on the diagnoses of paresis present, sensory aphasia and arterial hypertension, in order to provide a better quality of life.

## METHODS

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This case study follows CAse REport (CARE) guidelines<sup>(9)</sup>. This study was carried out in the context of clinical training, all the information collected was through interview with the person, observation, physical examination and consultation of clinical data in the hospital's computer program. The person was informed of the purpose of this study, ensuring anonymity, privacy, confidentiality and obtaining free and informed consent, respecting the ethical and confidentiality principles based on the Declaration of Helsinki and the Oviedo Convention.

Figure 1<sup>7</sup> Flowchart is presented according to the CARE flow diagram, following the model developed by Equator Network (2019). This is a case study of a 74-year-old Caucasian, married, retired male patient with a personal history of hypertension.

For the initial appraisal, the theoretical framework of the Activities of Living of Roper, Logan and Tierney was used, and after the careful analysis of the information collected, nursing diagnoses were formulated using taxonomy with the planning of the respective interventions and initial evaluation of the results and indicators according to the International Classification for Nursing Practice (ICNP), according to the most recent edition, from 2019.

Access to the selected electronic databases was carried out through the Bibliographic Catalogue Portal of the University of Évora and in turn through the EBSCO Online Knowledge Library (B-On), in the PubMed, SCieLO, Scopus and Google Scholar databases, using DeCS descriptors and the Boolean operator “And”, when using the descriptors “Ischemic stroke”, “Hemorrhagic stroke”, “Monitoring” and “Nursing care”.

The inclusion criteria adopted were as follows: experience-based report studies, case studies and original articles, published in national and international journals; who have used qualitative, quantitative and quantitative-qualitative approaches; published between January 2019 and July 2023, in the languages Portuguese and English; available online and with full text. A screening was carried out through a critical reading of the selected studies, which responded to the theme of this case report.

## RESULTS

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After data collection, an assessment of the patient according to the Activities of Living (ADL) of Roper, Logan and Tierney is presented in Chart 1<sup>7</sup> and the three most compromised ADLs – Breathing and Circulation, Mobility and Communication – are identified to focus on the main intervention needs. Three main nursing diagnoses were formulated: Paresis present in a moderate degree on the right side, Sensory Aphasia Present and Hypertension. Chart 1<sup>7</sup> will develop the ADLs in which significant changes were recorded compared to the previous condition of the patient.

We can assess that the elaboration of a care plan is one of the most important stages of the nursing process, since it is at this point that the nurse defines priorities and plans actions/interventions according to an elaborated diagnosis, with the objective of achieving positive final results. Decision-making involves the selection and implementation of specific nursing interventions, which can be performed through the International Classification for Nursing Practice (ICNP). The nurse identifies the nursing interventions and actions that will allow the patient to achieve the desired results (Chart 2<sup>7</sup>).

## DISCUSSION

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People with an acute stroke are at risk of stroke recurrence both in the short term (especially in the first week) and in the long term, and a healthy lifestyle, a balanced diet, exercise, weight control, reduction and cessation of alcohol and smoking habits, reduce the risk not only of an initial stroke but also the risk of recurrent stroke<sup>(10)</sup>. Before the event, Mr. JB had a poor diet, with food seasoned with a lot of salt, and he ingested alcohol socially.

Hemorrhagic transformation is a known risk of the natural course of an ischemic stroke. This complication can lead to a decline in functional outcomes, both in the short and long term, in patients either treated with reperfusion therapy or not<sup>(11)</sup>. This complication was not observed in the clinical case under study.

The diagnosis of hypertension is one of the main risk factors for the occurrence of a stroke, and the adoption of preventive measures makes it possible to reduce the number of deaths associated with cardiovascular diseases, as well as the number of hospitalization episodes, which constitute a complication<sup>(12)</sup>. Very high blood pressure values, on admission to the emergency department, may be a consequence of a neurologically severe clinical presentation, which means an adrenergic reaction, regardless of age or other concomitant medical conditions<sup>(11)</sup>. The current recommendations for the treatment of hypertension aim to obtain blood pressure values below 140/90 mmHg for those who already have a history of stroke<sup>(13)</sup>. Mr. JB remained normotensive, with values below the current recommendations, with a mean systolic blood pressure of 132 mmHg and diastolic blood pressure of 79 mmHg.

Clinically, ischemic stroke is diagnosed after imaging confirmation with CT or MRI. However, its identification should be carried out as early as possible exclusively through the symptomatology, through the evaluation of the patient. On admission, Mr. JB underwent ECG, which revealed sinus bradycardia, CT-CE, which revealed cortico-subcortical hypodensity on the left, reflecting probable acute ischemic injury in the territory of the left posterior cerebral artery, CT-angiography, with stenosis of the carotid bulbs bilaterally due to irregular atheromatous plaques, and MRI, performed to clarify lesions, revealing multiple lesions with diffusion restriction in the left hemisphere.

In this clinical case, when the objective is to evaluate the clinical findings in order to identify an alteration suggestive of a secondary lesion, the diagnoses identified as having greater relevance were paresis present, comprehension aphasia and hypertension. Through careful monitoring and recording, it was possible to identify problems *a posteriori*, including persistent hypertension, for which he was not previously medicated. Blood pressure control was achieved through medication, monitoring of cardiac status, continuous surveillance, and assessment of stress management ability and eating behaviors.

Age and neurological severity are among the most relevant risk factors for secondary injury. To measure this last factor, we used the NIHSS scales, initially evaluated with 5 points, the Canadian scale, assuming the patient's orientation, evaluated with consideration of comprehension deficits, which reveals facial and limb symmetry, the evaluation of the Glasgow Coma Scale, classified as 14 points, and the pupillary evaluation, in which isochoric and isoreactive pupils were verified. Usually, the severity of the symptoms of a stroke are an indicator for the extent of the brain damage, so the correlation is anticipated<sup>(11)</sup>.

During hospitalization, it is expected that the deficits presented at the time of admission will improve, which can be verified in this case by the improvement of motor deficits, with the transition from an initial hemiparesis on the right to only brachial paresis on the right, but not in the improvement of deficits in terms of comprehension.

The goal of post-stroke electrocardiogram monitoring is to identify atrial fibrillation<sup>(13)</sup>. People without previous detection of atrial fibrillation have a high risk of recurrent stroke, associated with a high level of disability. Current guidelines recommend long-term cardiac monitoring in high-risk patients, but do not specify the appropriate start to initiate such monitoring. Thus, non-stop ECG monitoring will be the most applicable and effective way to increase the detection range of atrial fibrillation after an ischemic stroke<sup>(14)</sup>. The patient was monitored for the entire duration of his hospital stay, during which no atrial fibrillation was detected.

The nurse responsible for a patient of this nature must have knowledge in the area of critical illness to be aware of all the signs and symptoms of possible complications. Through the elaboration of the care plan, we can verify the importance of measuring the results, before and after the nursing interventions, as it allows the evaluation of the evolution of the health condition during hospitalization.

One of the main focuses of stroke prevention remains the identification of the most likely etiology of stroke and the development of a personalized care plan<sup>(13)</sup>.



## CONCLUSION

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Studies have shown that ischemic stroke is one of the events in which, even though it is possible to reverse all the deficits caused by it, in most cases it can be accompanied by several complications, if care and surveillance are not adequate.

The treatment is related to the etiology of the disease, however the drug of choice used for thrombolysis is Alteplase, which has a high efficacy in restoring circulation and reducing post-event consequences but implies the fulfillment of a set of restrictive inclusion criteria, leading to other treatment methods.

Carrying out a nursing care plan in the case of a critically ill patient with this pathology is essential, as it aims to quickly identify all existing and possible problems and try to correct them to avoid complications. The measurement of post-stroke deficits and the implementation of an activity plan allows the level of dependence of the patient to be recorded, so that it is easy to identify changes to this dependence, which if increased, may mean the occurrence of a secondary injury. It was concluded that hypertension, present paresis and comprehension aphasia were the nursing diagnoses that favored the identification of the priorities of the care plan, based on the main needs of the patient and helped in the choice of outcomes and interventions.

The Inpatient Unit for Acute Patients of the Centro Hospitalar Universitário do Algarve in Portimão, the unit in which this clinical context was developed, is not structurally designed for a close surveillance of a person in the acute phase after ischemic stroke, as there is no neurologist scheduled for a more correct assessment of the patient's deficits in view of the monitoring and evaluations carried out. However, being a very differentiated unit in terms of the type of clinical cases it houses, even if the team is not exclusively trained for this type of care, it develops, within its capacities, rigorous care plans with regard to the assessment, monitoring and recovery of patients in this situation, with a speech therapy and physiotherapy team specialized in it.

This study is limited in time and results, as the follow-up of the patient was limited to one week of hospitalization and could not monitor the evolution of the effectiveness of nursing care. Being an isolated case study, we cannot generalize to other clinical settings.

However, the results obtained made it possible to understand the specific characteristics of patients with clinical manifestations of stroke, as well as the main results and interventions, allowing nurses to expand their possibilities of action.

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**Authors' contributions/Contributos dos autores**

TM: Study coordination, study design, collection, storage and analysis review and discussion of results.

MT: Study design, data analysis, review and discussion of results.

IB: Study design, data analysis, review and discussion of results.

SM: Study design, data analysis, review and discussion of results.

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Figure 1 - Flowchart presentation of the clinical case according to the Activities of Daily Living.<sup>κ</sup>

Chart 1 – Evaluation according to the Roper, Logan, and Tierney Activities of Daily Living model.<sup>→κ</sup>

ADL	Observation/Evaluation	Nursing Focus
Breathing and circulation	Hemodynamically, has dysrhythmic cardiac trace, with a tendency for bradycardia at rest ranging 35-50 bpm but sinus when awake. Tendency for hypertension with systolic blood pressure values ranging 170-180 mmHg and diastolic blood pressure ranging 90-100 mmHg. Antihypertensive therapy was introduced, with a positive outcome. Eupneic without the use of additional O2 intake due to adequate saturation (from 97 to 100%). Has a bradypneic, thoracic, symmetrical, regular and deep breathing.	<b>Regulatory System Process</b>
Mobility	The patient presents hemiparesis of brachial predominance with hypotonia of the hand, neglect on the right and dysmetria of the right upper limb. On the NIHSS scale, neurological deficits were assessed at my first contact with 5 points. In the Canadian scale, the assessment was carried out assuming the orientation of the patient and the motor deficits taking into account the symmetry of the face, arm and lower limb.	Paresia Ability to transfer
Communication	Presents confusion and aphasia of expression and comprehension. The difficulty in understanding may be influenced by the language barrier, since the patient only spoke German. Does not report pain complaints.	<b>Impaired cognition</b> Barrier to communication
Sleep	Calm, conscious, and alert, and it is not possible to assess their orientation accurately due to the language barrier. When assessed by the Glasgow Coma Scale, it obtains an average value of 14 points. Has a sleep pattern of 6 hours average, not having to resort to therapy to initiate or maintain sleep.	Rest pattern
Maintaining the Safe Environment	Parameters relating to a safe environment are maintained, bed support bars were raised, for the prevention of falls. In addition to the above, all the necessary precautions to prevent infection are put into practice, such as washing and/or disinfecting hands before and after contact and using PPE (personal protective equipment). Has a peripheral venous catheter in the left upper limb, which is obturated. When the Morse Scale for Assessment and Prevention of Fall Risk was applied, a value of 30 points was obtained, which means having a moderate risk of falling. When the Braden Scale for Evaluation and Prevention of Pressure Ulcers was applied, a value of 18 points was obtained, which means a low risk of developing pressure ulcers.	Fall Infection
Feeding	Inpatient diet follows a general salt-free diet and is moderately dependent on the staff due to changes in mobility, but without dysphagia, as assessed by speech therapy. When the GUSS scale was performed, the result of 20 points was obtained, revealing no dysphagia. The amount of fluids ingested is managed by them.	Ability to feed Aspiration
Elimination	Eliminations are in the bedpan and urinal, which they requested. Maintains her normal bladder elimination pattern, having daily urination, with <i>sui generis</i> color in moderate amount. Has bowel releases, usually in moderate amounts, brownish in color and molded.	Ability to use toilet

Chart 1 – Evaluation according to the Roper, Logan, and Tierney Activities of Daily Living model.<sup>↵↵</sup>

ADL	Observation/Evaluation	Nursing Focus
Personal hygiene	Hygiene care is performed at the bedside, due to their total dependence by the loss of mobility. However, he positioned himself on the bed. Has discolored but hydrated mucous membranes.	Ability to perform hygiene
Body temperature control	Their body temperature is measured once per shift.	-
Work & Leisure	The patient's occupation before the stroke is not known, as well as the leisure activities, only knowing that he would be in Portugal as a family leisure vacation, with his wife.	-
Expression of sexuality	He is married and his wife visits him daily during the period of hospitalization.	-
Death	No recent deaths of family members or close friends are known.	-

Chart 2 - Care plan according to the ICNP taxonomy.<sup>6</sup>

Focus	Diagnosis	Intervention	Findings
Circulatory system process	Hypertension	Administer medication	Adherence to the medication regimen. Effective circulatory system function.
		Assess ability to manage stress	
		Assess eating or drinking behavior	
		Monitor heart status	
		Continuous surveillance	
Ability to mobilize	Paresis present to a moderate degree on the right side	Assessing patient's actions	Effective musculoskeletal system function. Effective active range of motion.
		Monitor neurological function using the Canadian Scale	
		Evaluate swallowing reflex	
		Assess muscle strength	
		Assess sensitivity	
		Assess sensory perception	
		Massaging body parts	
		Assist the person in positioning	
Impaired cognition	Sensory aphasia of comprehension	Assess state of consciousness	Effective neurological status.
		Monitoring visitors	Effective interactive behavior.
		Assess confusion	Able to communicate.
		Evaluating communication	