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REVIEW

Factors influencing mortality in patients diagnosed with intraparenchymal hemorrhage

Factores que influyen en la mortalidad de pacientes con diagnóstico de hemorragia intraparenquimatosa

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ABSTRACT

Introduction: apoplexy or apoplectic stroke is the clinical term given to the acute loss of blood supply to a region of the brain, resulting in ischemia and loss of neurological function.
Objective: to describe the factors that influence mortality in patients diagnosed with intraparenchymal hemorrhage in studies published in the PubMed and LILACS databases during the period 2020-2025.
Method: a literature review study was conducted in the LILACS and PubMed databases in April 2025. A total of 21 articles were obtained from LILACS and 36 articles from PubMed, and 57 articles were preselected.
Development: age and a history of diabetes mellitus are strongly associated with mortality. Additional studies show variability in incidence, with the presence of ventricular extension, blood glucose at admission, and measurement of the ipsilateral dilated optic nerve sheath as prognostic factors in this group.
Conclusions: age, the presence of ventricular extension, and blood glucose at admission are highly associated with mortality. Several prognostic scales are used, with various limitations, but the Glasgow Coma Score was the most widely used in this study.

Keywords: Intraparenchymal Hemorrhage; Mortality; Prognostic Scale.

RESUMEN

Introducción: la apoplejía o ictus apoplético es el término clínico dado para la pérdida aguda de la irrigación sanguínea de un territorio del cerebro, que resulta en isquemia y una pérdida de la función neurológica.
Objetivo: describir los factores que influyen en la mortalidad de pacientes con diagnóstico de hemorragia intraparenquimatosa en estudios publicados en base de datos de PubMed y LILACS en el periodo de 2020-2025.
Método: se realizó un estudio de tipo revisión bibliográfica en las bases de datos LILACS y PubMed en el mes de abril de 2025, se obtuvo un total de 21 artículos en LILACS y 36 artículos en PubMed, se preseleccionaron 57 artículos.
Desarrollo: se puede identificar que la edad y el antecedente de diabetes mellitus presentan una fuerte incidencia como factores clínicos asociados a la mortalidad, en los estudios complementarios se observa una variabilidad en la incidencia donde se identifica la presencia de extensión ventricular, glucemia al ingreso y la medición de la vaina del nervio óptico dilatado ipsilateral como elementos pronósticos de este grupo.
Conclusiones: La edad, la presencia de extensión ventricular y la glucemia al ingreso constituyen factores con alta asociación a la mortalidad, se utilizan varias escalas pronosticas con diversas limitantes, pero es la escala de coma de Glasgow la de mayor utilización en el estudio.

Palabras clave: Hemorragia Intraparenquimatosa; Mortalidad; Escala Pronosticas.

INTRODUCTION

Stroke or apoplectic stroke is the clinical term given for the acute loss of blood supply to a territory of the brain, resulting in ischemia and a loss of neurological function. Known as cerebrovascular diseases (CVD) they are a global health problem; they constitute the third leading cause of death, the first cause of adult disability and the second cause of dementia on the planet.[1]

According to AHA (American Heart Association) statistics, in the year 2020, worldwide, CVD caused 7,08 million deaths; of these 3,25 million were of ischemic origin, 3,25 million due to intracerebral hemorrhage (ICH) and 0,35 million due to subarachnoid hemorrhage. ICH accounts for 10-15 % of all CVD.[2].

ICH is a disease whose incidence increases with age, although statistics for the last ten years show that more and more people under 60 years of age are suffering from this type of hemorrhagic stroke.[3]

We are faced with a disease that, in addition to presenting a high mortality, means a great socioeconomic burden worldwide, as demonstrated in a systematic epidemiological review of 119 studies. Its results show an increase in the socioeconomic burden of 47 % between 1990 and 2010, with differences between countries with high, medium and low economic incomes, with the incidence being higher in the latter compared to the former. This is reflected, in turn, in the significant percentage of disability-adjusted life years (DALYs) of low- and middle-income countries.[4]

Due to all of the above, it is necessary to study the factors that influence mortality in ICH, in order to reduce morbimortality, the negative effects on the quality of life and the economy of these patients. The aim of this research is: to describe the factors influencing mortality in patients diagnosed with ICH in studies published in PubMed and LILACS database in the period of 2020-2025.

METHOD

A literature review study was conducted at the University of Medical Sciences of Guantanamo and Dr. Agostinho Neto General Teaching Hospital in Guantanamo province, Cuba, in April 2025.

Search strategy

The LILACS and PubMed databases were accessed from April 10 to 21, 2025. A search formula using the Boolean operator term (OR, AND) was used to search for information.

The search was performed for articles included in the period 20002025. The resulting search strategy was as follows:

In LILACS database: (intraparenchymal hemorrhage) OR (intracerebral hemorrhage) AND (mortality) AND (scale) AND (year_cluster:[2020 TO 2025]) AND instance: “lilacsplus”.

In PubMed database: (((Intraparenchymal hemorrhage) OR (Intracerebral hemorrhage)) AND (Mortality)) AND (Scale) Filters applied: in the last 5 years, Full text, Meta-Analysis, Review, Systematic Review, Adult: 19+ years.

A total of 21 articles were obtained in LILACS and 36 articles in PubMed, 57 articles were pre-selected, of which 4 articles were chosen after applying the inclusion and exclusion criteria, (figure 1).

Inclusion criteria: Meta-analysis type articles, original, bibliographic and systematic reviews, published in the period 2020-2025, in people older than 19 years, in Spanish and English, published in open access.

Exclusion criteria: published articles that are not related to the research topic, not accessible in full text and duplicate articles.

Limits: no access to paid articles online.

Prognostic factors for mortality

In the observed studies it can be identified that age and history of diabetes mellitus present a strong incidence as clinical factors associated to mortality, in the complementary studies a variability in the incidence is observed where the presence of ventricular extension, glycemia at admission and the measurement of the ipsilateral dilated optic nerve sheath are identified as prognostic elements of this group.

DEVELOPMENT

Demographic data

In total, 306 patients with a diagnosis of intrapaenchymal hemorrhage were included (167 men [54, 5 %], 139 women [45, 4 %]) with a mean age of 53, 3 years. Arterial hypertension constituted a primary risk factor (211 patients [68 %]), data related to the international mean.[5] Fifty percent of the articles were observational and were funded, in agreement with the study by Chibas et al. This infers that clinical studies are the most

prevalent in the area, since they provide the most clinical evidence of these factors (table 1).

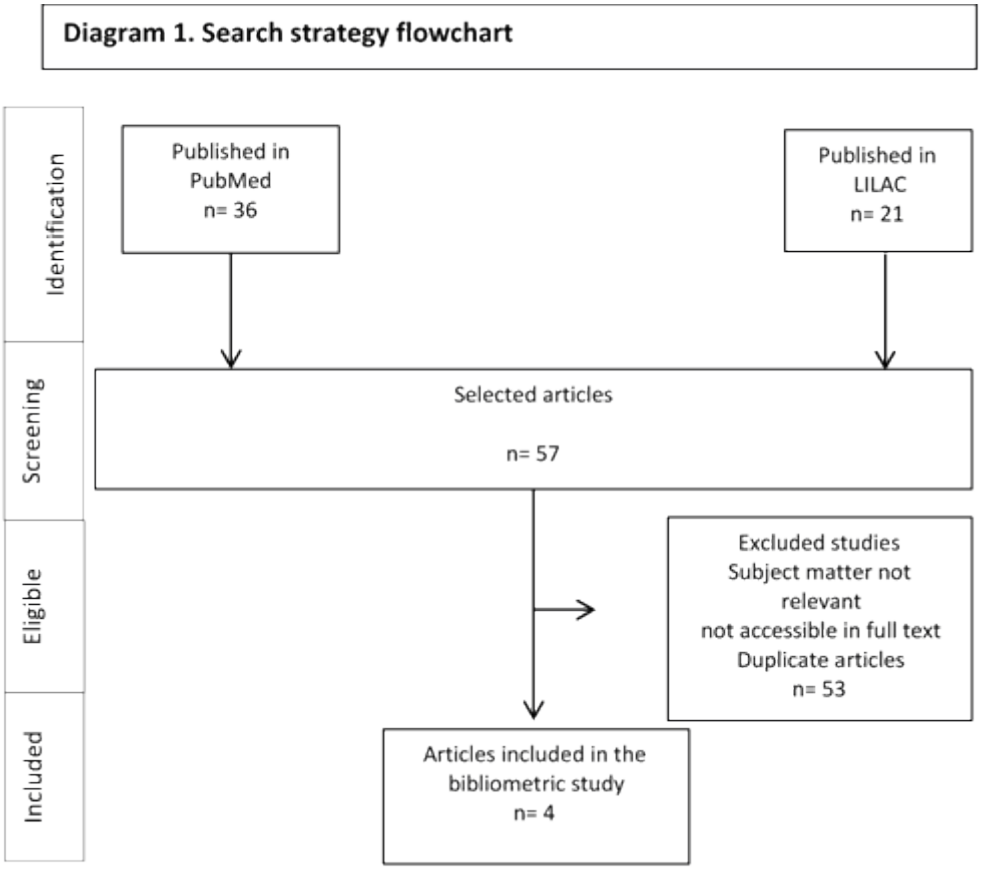

Figure 1. Search strategy flowchart

Table 1. Distribution of articles according to clinical data, complementary studies and prognostic scales that influence mortality due to intrapaenchymal hemorrhage

Variables	Authors	Title of research	Results
Clinical data	Rodríguez-Venegas E de la C et al.[7]	Factors in the prognosis of mortality in patients with spontaneous intracerebral hemorrhage	age older than 80 years (p=0,001); and treatment with oral anticoagulants (p=0,023); these data are statistically significant, with a 95 %CI
	Antunes Dias F. et al.[8]	Dilated optic nerve sheath by ultrasound predicts mortality among patients with acute intracerebral hemorrhage	diabetes mellitus and current non-smoking status were predictors of mortality
	Saal-Zapata G. et al.[9]	Predictors of in-hospital mortality and poor functional prognosis in patients undergoing surgical evacuation of intracerebral hemorrhage.	As predictors, female sex (OR 3,47, p = 0,008), anisocoria at admission (OR 4,16, 95 %CI 1,11 - 15,52, p = 0,034),
	Martina Echarri M. et al.[10]	In-hospital mortality due to stroke in an urban center in Argentina.	The presence of diabetes mellitus shows a strong association with mortality, with a 9,11-fold increased risk compared to persons without diabetes mellitus (p = 0,011).
Complementary studies	Rodriguez-Venegas E de la C et al.[7]	Factors in the prognosis of mortality in patients with spontaneous intracerebral hemorrhage	the presence of ventricular extension (p=0,001) in CT was statistically significant for values of p<0,05, with a confidence interval of 95 %.
	Antunes Dias F. et al.[8]	Dilated optic nerve sheath by ultrasound predicts mortality among patients with acute intracerebral hemorrhage	admission blood glucose (p = 0,01), ipsilateral dilated optic nerve sheath (p = 0,02), were predictors of mortality.

Prognostic scales	Rodríguez-Venegas E de la C et al.[7]	Factors in the prognosis of mortality in patients with spontaneous intracerebral hemorrhage.	ECG (p=0,005) is identified as a predictor of mortality.
	Antunes Dias F. et al.[8]	Dilated optic nerve sheath by ultrasound predicts mortality among patients with acute intracerebral hemorrhage.	ECG, NIHSS(p=0,003)
	Saal-Zapata G. et al.[9])	Predictors of in-hospital mortality and poor functional prognosis in patients undergoing surgical evacuation of intracerebral hemorrhage	ECG < 8 at admission (OR 3,87, 95 %CI 1,5 - 10,02, p = 0,005),

Notes: ECG: Glasgow Coma Scale, CT: Computed Axial Tomography, 95 % CI: 95 % confidence interval, NIHSS: National Institute of Health Stroke Scale.

Prognostic scales in ICH

Prognostic scales are instruments used to match data on patients to allow clinical management decision making. There are several scales used in the prognosis of ICH (table 2), with common limitations such as the development of these scales mainly with data from high-income countries, most of them privilege the prediction of mortality over quality of life, and little consideration of socioeconomic factors and access to rehabilitation.

In this study, the authors could not identify studies related to the use and modification of prognostic scales in the repository of Theses in Biomedical Sciences[11] and Health Sciences, as well as in the Cuban Journal of Neurology and Neurosurgery.[12]

Among the recognized prognostic scales, the Glasgow Coma Scale is the most useful in the selected studies (table 1). The limitation of this scale is that it is not specific to evaluate mortality in patients diagnosed with ICH.

Table 2. Prognostic Scale in Spontaneous Intraparenchymal Hemorrhage: Comparative analysis of components, limitations, positive and negative aspects

Scales	Components Evaluated	Positive Aspects	Limitations/Negative Aspects
ICH Score[13]	Age Admission ECG Hematoma volume Location (supra/ infratentorial) Ventricular extension	Simple and quick to apply Validated in multiple populations Good correlation with 30-day mortality Useful for triage and initial decision making	Underestimates disability in survivors Does not consider comorbidities Poor accuracy in long-term functional prediction Developed with small cohort (152 patients)
FUNC Score[14]	Age ECG Hematoma location Hematoma volume Previous comorbidities	Focused on prediction of functional independence Includes comorbidities Useful for rehabilitation planning	Requires knowledge of comorbidities Less used in acute phase Limited external validation
Graeb Scale(for HV)[15]	Blood volume in ventricles Ventricular distension	Specific for intraventricular hemorrhage Correlation with hydrocephalus Useful to decide ventricular drainage	Does not evaluate parenchymal component Subjectivity in measurement Poor correlation with global prognosis
Modified Graeb Scale[16]	Similar to Graeb but with more detailed scoring	Higher accuracy than original Graeb Better correlation with prognosis	Greater complexity Requires experience in neuroimaging
NIH Stroke Scale (NIHSS)[17]	Neurological deficits and degree of functional recovery.	Sensitive to neurological changes Widely used Validated in various contexts	Not specific for ICH Less useful in intubated patients Does not consider imaging variables

Notes: ECG: Glasgow Coma Scale, NIHSS: National Institute of Health Stroke Scale, HV: hemorrhage volume.

Final considerations

Age, the presence of ventricular extension and glycemia on admission are factors with a high association with mortality. Several prognostic scales are used with various limitations, but the Glasgow Coma Scale is the most widely used in the study.

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FINANCING

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CONFLICT OF INTEREST

None.

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