

Notes on the epidemiology of artificial mechanical ventilation and stroke

Abstract

Artificial mechanical ventilation in the course of stroke presents a high mortality. Even today, with advanced knowledge in the pathophysiology of the neurological event and modern techniques of respiratory support, it continues to be a problem of interest, which invites to reflect on the benefits of ventilation in this field. In Cuba, there is not enough research on the subject, however, mortality due to this cause is high. This phenomenon, which implies high costs and limited functional recovery in survivors, should continue to be studied.

Keywords: stroke, artificial mechanical ventilation, epidemiology, costs, mortality

Volume 14 Issue 2 - 2022

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Received: April 15, 2022 | **Published:** April 29, 2022

Opinion

Respiratory complications in stroke patients represent the most important source of morbidity and mortality in neurocritical care, the risk of hypoxia may be due to respiratory muscle weakness, aspiration or alteration of breathing regulation of central cause.

In the U.S., since the 1990s approximately 10% of stroke patients developed respiratory failure requiring intubation and artificial mechanical ventilation (AMV), which accounted for approximately 80 thousand patients per year.¹ Other conditions and disorders that often occur in these patients include pneumonia, acute respiratory distress syndrome, neurogenic pulmonary edema, as well as the development of abnormal breathing patterns. These pulmonary complications represent a barrier to recovery and treatment, and have significant effects on hospital course outcomes, prognosis and mortality.² Usually the stroke patient with pulmonary complications requiring AMV is taken as a subject exclusive to intensive care, being left out of most neurology texts and leaving neurological patient clinicians deprived of essential tools for the initial assessment and treatment of this particular type of patient.

Multicenter studies show that 18 % of neurocritical patients need AMV. Data obtained since the 80 and 90 suggest that, this type of patient had a worse prognosis and some authors questioned the usefulness of this life support therapy.¹ Claiming that AMV in these cases only delayed the final outcome and caused distress in the relatives,³ in addition to generating extremely high economic costs, with poor survival and low quality of life of these survivors. Mayer et al.⁴ state that the cost of hospitalization in patients discharged alive after being under VMA in the course of a stroke is 89,400 US dollars (USD) and 37,600 USD per year of survival.

In the opinion of the author of this manuscript, the critical point was the debate, at that time, of converting a “dignified death” into a slow and exhausting process in terms of the patient’s clinical condition, where the “therapeutic incarnation” often became “therapeutic futility”.

Considering that AMV by itself is capable of inducing or aggravating the underlying pulmonary compromise, the appropriate use of AMV is fundamental.⁵ This confers to AMV in the course of stroke a severe condition with high morbidity and mortality and limited functional recovery.⁶

In Cuba, the main cause of mechanical ventilation in 2005 was non-traumatic neurological diseases (mainly cerebrovascular diseases in their most critical stages). However, these percentages varied throughout the country.⁷

Currently in the country there is no national registry of AMV or stroke that includes, among other topics, the mortality of patients ventilated for this cause and, as is the case in the international arena, data on neurocritical patients are limited. Most of the published records correspond to series of ventilated patients in general, in which, if neurocritical patients are measured, they represent only a remarkable percentage in the clinical setting; however, within the neurocritical pathologies, it is the attention to acute trauma brain that provides the greatest number of investigations. On the other hand, neurointensivism is not registered as a subspecialty of neurology or intensive care medicine, and only one intensive care unit dedicated entirely to neurological patients is recognized as a national reference, located at the Institute of Neurology and Neurosurgery of Havana.

What is evident is the high mortality rate, according to the different studies analyzed. Table 1 describes epidemiological characteristics of interest in these patients. It is important to clarify that due to the “heterogeneity” of the studies of patients under AMV, for the adequate analysis suggested by the author, only studies that allowed compiling data on patients with stroke and AMV were included.

Recently, Sosa-Remón A et al.¹⁸ studied a series of patients with stroke who required invasive VMA in a General Hospital in Granma, Cuba. In the study, neurological factors associated with death were evaluated, in addition to proportional mortality. The reported data expose that proportional mortality predominated in hemorrhagic stroke type non-traumatic intracranial hemorrhage ($p=0.118$), absence of brainstem reflexes ($p=0.000$), anisocoria ($p=0.000$), Glasgow Coma Scale <8 points ($p=0.000$) and neurological complications such as endocranial hypertension ($p=0.010$). Neurological factors associated with mortality were absence of brainstem reflexes, anisocoria, Glasgow coma scale <8 points and neurological complications such as endocranial hypertension.

The study, considered one of the few performed on the island, invites reflection on the behavior of this entity and the need to continue studying the development of the disease, its complications and prognosis.

Table 1 Epidemiology of patients with stroke and AMV in Cuba. Published studies

Studies	Objective and Observations of the study	tVMA	vACV	mACV	%T	pM
Caballero-Font et al. ⁸	To establish occult mortality and risk factors associated with its increase in patients with AMV after discharge from an ICU	140*	22†	2	1,4	9,09
Suárez-Méndez et al. ⁹	Description of the behavior of AMV in the ICU. Did not quantify mACV	84	16	-	19,04	-
Vila-García et al. ¹⁰	To characterize the modifiable factors associated with in-hospital stroke lethality	19	19	13	100	68,42
Gan-Fong et al. ¹¹	Clinical-epidemiological characterization of patients with cerebral hemorrhage and AMV.	70‡	60§	55	78,57	91,66
Agüero-Rodríguez et al. ¹²	Morbidity behavior of patients with AMV in an ICU. Did not quantify mACV	220	56	-	25,45	-
Landa-Toimil et al. ¹³	Assessment of the efficacy of the APACHE II prognostic system on mortality in patients with AMV.	100	13	13	13	100
Sáez-Zúñiga et al. ¹⁴	To determine the predictive indicators of mortality in patients with SAH in relation to the application of their definitive treatment.	30	30	14	46,66	46,66
Almeida-Alfonso et al. ¹⁵	Clinical-epidemiological characterization of patients with AMV. Only hemorrhagic stroke was found	51	6	5	9,8	83,33
Brito-Cruz et al. ¹⁶	Description of the behavior of mACV in ICU. Did not quantify mACV	45	4	-	8,88	-
Martínez-Llopiz et al. ¹⁷	Description of the behavior of AMV in the ICU. Did not quantify mACV Morbimortality in patients with AMV.	43	9	8	29,7	88,88

tVMA, total patients under AMV; vCVA, patients with stroke and AMV;

mACV, mortality of patients with stroke and VMA; %T, percent with respect to tVMA (Calculated by authors); pM, proportional mortality: (Calculated by authors).

*Only cases studied; †Identifies them as non-traumatic lesions of the central nervous system; ‡Patients with ischemic and hemorrhagic stroke;

§Hemorrhagic stroke only

Conclusion

The appearance of respiratory complications in the course of stroke places demands on the appropriate therapeutic strategy to optimize both respiratory and neurological care. This and other complications such as a low Glasgow Coma Scale score, loss of brainstem reflexes and artificial mechanical ventilation itself cast a shadow over the prognosis.

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