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Original Article

Mortality, level of dependence, and perception of the experience in elderly patients undergoing prolonged mechanical ventilation

Mortalidade, nível de dependência e percepção da experiência vivenciada em idosos submetidos à ventilação mecânica prolongada

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ABSTRACT

Introduction: Elderly patients admitted to intensive care units (ICUs) face intense symptoms, associated with increased mortality and physical, psychological, and cognitive sequelae. Prognostic factors, such as advanced age and time on mechanical ventilation play a crucial role in this challenging scenario.

Objectives: To assess the impact and degree of dependence on prolonged mechanical ventilation in elderly patients, after discharge from the ICU.

Methods: A cross-sectional study was carried out with 164 patients aged 60 years or over, who underwent invasive mechanical ventilation for 14 days or more between January and October 2021.

Results: In-hospital mortality was 70.7%, increasing to 74.4% after 12 months, showing a significant correlation with age (p = 0.032). Moreover, 54.3% of patients showed a worsening in functional dependence after one year (p < 0.0001). Notably, the majority of survivors (91.4%) expressed their willingness to undergo mechanical ventilation again if necessary.

Discussion: The results point to high persistent mortality and functional impairment in elderly patients even one year after discharge from the ICU. Despite these adversities, most survivors reported that the invasive treatment was worth it.

Keywords: Aged; Artificial Respiration; Outcome Assessment, Health Care.

RESUMO

Introdução: Pacientes idosos internados em unidades de terapia intensiva (UTIs) enfrentam sintomas intensos, associados a aumento da mortalidade e sequelas físicas, psicológicas e cognitivas. Fatores prognósticos, como idade avançada e tempo em ventilação mecânica, desempenham papel crucial nesse cenário desafiador.

Objetivos: Avaliar o impacto e o grau de dependência da ventilação mecânica prolongada em pacientes idosos após alta da UTI.

Métodos: Estudo transversal realizado com 164 pacientes com idade igual ou superior a 60 anos, submetidos à ventilação mecânica invasiva por 14 dias ou mais, no período de janeiro a outubro de 2021.

Resultados: A mortalidade intra-hospitalar foi 70,7%, aumentando para 74,4% após 12 meses, evidenciando uma correlação significativa com a idade (p = 0,032). Adicionalmente, 54,3% dos pacientes apresentaram piora na dependência funcional após um ano (p < 0,0001). Notavelmente, a maioria dos sobreviventes (91,4%) expressou aceitar ser submetido à ventilação mecânica novamente, se necessário.

Discussão: Os resultados apontam para uma elevada mortalidade persistente e comprometimento funcional em pacientes idosos mesmo após um ano da alta da UTI. Apesar dessas adversidades, a maioria dos sobreviventes relatou que o tratamento invasivo valeu a pena.

Palavras-chave: Idoso; Respiração Artificial; Avaliação de Resultados em Cuidados de Saúde.

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INTRODUCTION

In the face of increasingly advanced technologies, intensive care units (ICUs) have managed to prevent deaths in the short term through advanced life support measures and other intensive treatments[1]. All these efforts are commendable when there is a real possibility of reversing the critical situation and the interventions and their consequences are within what is considered acceptable for the patient. However, besides the intense symptoms that lead to suffering during hospitalization, such as pain, shortness of breath, thirst, anguish, fear and delirium, the sequelae of survivors are very frequent and intense, considered by many to be devastating[2]. Among the frequent consequences of critical illness are new or worsened physical, psychological and/or cognitive impairments, changes which make up the Post Intensive Care Syndrome (PICS). This syndrome also affects patients' relatives, causing anxiety, depression and/or post-traumatic stress syndrome, known as Post ICU – Family Syndrome (PICS-F)[3-10]. Post-ICU mortality is up to five times higher than in the general population and some studies show that most deaths occur in the first three months after discharge[3-11].

The Brazilian population, like the world population, is increasingly made up of elderly people. This age group already makes up more than half of the patients admitted to ICUs. Many elderly people already have several comorbidities and have a quality of life that is far from acceptable. It has been proven that advanced age is an isolated risk factor for negative outcomes in ICUs[1].

It is worth highlighting the recent scenario of the COVID-19 pandemic, which has caused millions of cases of acute respiratory syndrome associated with the need for ICU admission, with high mortality rates[12]. Infected elderly people were more likely to require hospitalization and ICU admission, as well as having a higher mortality rate[13].

Along these lines, assessing the repercussions of long periods spent on mechanical ventilation can help in decision-making about the indication and technical and bioethical suitability of invasive measures. Allied to this context, palliative care helps with informed and autonomous decision-making in life-threatening situations. It also prevents and controls physical, emotional, spiritual, and social symptoms for patients and their families.

This study aims to assess the impact and degree of dependence on prolonged mechanical ventilation in elderly patients after discharge from the ICU.

METHODS

A cross-sectional study was carried out with elderly patients aged 60 or over who underwent 14 days or more of invasive mechanical ventilation in the Intensive Care Unit (ICU) of the *Hospital de Clínicas de Porto Alegre* (HCPA) between January and October 2021. During this period, 165 patients met these inclusion criteria, making up the study population. Only one of these patients was excluded because they had not previously allowed access to their medical records. The sample therefore totaled 164 patients. Data on in-hospital mortality was collected directly from the patients' medical records, and on post-discharge mortality through contact with family members.

The following variables were collected: gender; type of hospitalization (clinical, surgical or psychiatric); duration of mechanical ventilation; vasopressor use; renal replacement treatment; tracheostomy; blood product transfusion; use of extracorporeal oxygenation membrane (ECMO); COVID-19 diagnosis; and comorbidities such as neoplasm, chronic renal failure (on previous dialysis treatment), heart failure, atrial fibrillation, systemic arterial hypertension, diabetes mellitus, chronic obstructive pulmonary disease (COPD), cirrhosis, asthma, encephalopathy (any etiology), acquired immunodeficiency syndrome (AIDS), peripheral vascular disease, and neuromuscular disease.

Telephone contact was made 12 months after discharge from the ICU. Contact was made directly with the patient or with their relatives when the patient was unable to respond. Only 41 patients were alive one year after discharge. This was the sample used to check the degree of dependency. It was possible to locate 35 of these patients (85.36%). The Katz functional capacity questionnaire was applied to the situation before hospitalization and at the time of data collection, and the Katz index was calculated for these two periods[14]. These patients were also asked the following question after one year: "If you had to, would you go through the whole process of being intubated and connected to the respirator again, and would you go through everything that happened afterwards again, if necessary, to save your life? In other words, was it worth it?"

The data was evaluated using the SPSS program. The data was described using means, standard deviations and relative frequencies. The *t*-test was used to assess differences and the chi-square test to measure associations. The significance level established was 5% ($p < 0.05$).

Consent to take part in the study was obtained by telephone, with the participant's authorization given verbally and recorded. The study was approved by the institution's research ethics committee under CAAE 54350721800005327.

RESULTS

The medical records of 164 elderly patients aged 60 or over who remained on mechanical ventilation for at least 14 days between January and October 2021 were evaluated. Of these, 130 were hospitalized with a diagnosis of COVID-19 (79.3%) and 34 for other reasons (20.7%), including eight (4.9%) for surgical reasons (Table 1).

Of the 164 patients at the start of the study, 116 died during hospitalization, resulting in an overall mortality rate of 70.7%. After 12 months of discharge, six more patients died, totaling 122 deaths with a 12-month mortality rate of 74.4%. Of these, four were COVID-19 patients and two non-COVID-19.

There was no difference in mortality during hospitalization (p = 0.583) between COVID-19 patients (69.2%) and non-COVID-19 patients (76.5%). Nor was there any difference in the

Table 1. Baseline characteristics and interventions.

Characteristics	General (n = 164) N (%)	Hospital deaths (n = 116) N (%)
Age range (years)		
60-69	110 (67)	72 (65.4)
70-79	48 (29.2)	39 (81.25)
80-89	6 (3.6)	5 (83.3)
Gender		
Female	67 (40.8)	46 (68.6)
Male	97 (59.1)	72 (74.2)
Reason for admission		
Clinical	156 (95.1)	110 (70.5)
Surgical	8 (4.8)	6 (75)
Psychiatric	0 (0)	0 (0)
Comorbidities		
COPD	22 (13.4)	18 (81.8)
Heart failure	18 (10.9)	13 (72.2)
Neoplasm	13 (7.9)	11 (84.6)
CRF on dialysis	3 (1.8)	3 (100)
Atrial fibrillation	9 (5.4)	8 (88.8)
SAH	109 (66.4)	76 (69.7)
DM	67 (40.8)	47 (70.1)
Cirrhosis	1 (0.6)	0 (0)
Hypothyroidism	23 (14)	13 (56.5)
Asthma	7 (4.2)	5 (71.4)
Encephalopathy	6 (3.6)	5 (83.3)
AIDS	6 (3.6)	5 (83.3)
Peripheral Vascular Disease	7 (4.2)	5 (71.4)
Neurodegenerative Disease	2 (1.2)	2 (100)
COVID+	130 (79.2)	90 (69.2)
Use of vasopressor	156 (95.1)	112 (71.7)
Need for dialysis	77 (46.9)	59 (76.6)
Tracheostomy performed	66 (40.2)	37 (56)
Received blood products	75 (45.7)	55 (73.3)
ECMO	0 (0)	0 (0)

Abbreviations: COPD: Chronic obstructive pulmonary disease; CRF: Chronic renal failure; SAH: Systemic arterial hypertension; DM: Diabetes mellitus; AIDS: Acquired immunodeficiency syndrome; COVID+: Coronavirus positive; ECMO: Extracorporeal oxygenation membrane.

assessment of mortality after one year (p = 0.179), with 72.3% for COVID-19 patients and 84.8% for non-COVID-19 patients.

The patients' ages ranged from 60 to 87 years, with a mean age of 67.1 (± 5.6) years. When the influence of age on mortality was assessed, a progressive increase in mortality was observed as the age increased (p = 0.032), from 65.4% for patients aged 60 to 69, 82.6% from 70 to 79 and 83.3% for patients aged 80 or over. As for mortality one year after discharge, there was no association with age (p = 0.070), with 70.0% for patients aged 60 to 69, 84.4% for those aged 70 to 79 and 83.3% for those aged 80 or over.

During the hospitalization period, younger patients had a higher survival rate than the others, a fact that was no longer observed one year after discharge. In other words, the 60 to 69 age group had an increase in mortality that brought them into line with the other groups. Of the 35 survivors who responded to the survey, 31 had a diagnosis of COVID-19 (88.6%) and four did not (11.5%). Comparing the two time periods, a significant association was found between the degree of dependence and the time elapsed (p < 0.0001), with 54.3% of patients showing a change in category to a higher degree of dependence, compared to the previous time period and one year after hospitalization (Table 2).

Table 2. Change in degree of dependence before ICU admission and use of mechanical ventilation one year after ICU discharge.

	Independent	Partially dependent	Totally dependent
Before	88.6%	11.4%	0.0%
After one year	40.0%	51.4%	8.6%

Regarding the experience of ICU care, the surviving patients were asked, one year after discharge, whether they would agree to undergo the procedures again, especially intubation. The majority, 32 patients (91.4%), replied that they would agree to undergo the procedures again if they were necessary. Only three patients (8.5%) reported that they would prefer death to having to go through the same situation.

DISCUSSION

The high in-hospital mortality of this study population is striking, as is mortality after hospital discharge. The literature presents different definitions for prolonged mechanical ventilation, ranging from four days to 21 days or more on invasive ventilatory support, making it difficult to compare studies. Hospital mortality varies from 21.8% to 97% between studies, and 12-month mortality from 45% to over 97%[15-21]. Only 8.5% of elderly patients who underwent 14 days or more of mechanical ventilation were alive and fully independent after 12 months (9.2% of COVID+; 5.6% of non-COVID). This result was very similar to that found in an American study, in which 9% were functionally independent after one year[22]. No other physical dysfunctions or cognitive or psychological alterations were investigated in this study.

This study was carried out in a single tertiary hospital during the SARS-CoV-2 pandemic. As it was carried out in a referral hospital for the treatment of patients with acute respiratory syndrome during the pandemic, there were also frequent transfers of patients to other hospitals with a view to continuity of care after treatment of the acute phase. Therefore, despite being unicentric, some patients in the study had continuity of care in other institutions. The work overload of professionals during the pandemic, many with little experience in intensive care, may have contributed to the negative outcomes. Moreover, with the scarcity of resources due to hospital overcrowding, we need to consider that many elderly patients may not have had the opportunity to receive treatment in intensive care units, due to flaws in the resource allocation strategy. The need to use equipment that is not specific to the intensive care environment, such as artificial respirators in operating rooms, has also become notorious, with a consequent drop in the quality of care with this adapted technology. In addition, the shortage of medicines and the need to adapt similar drugs, such as for analgesia, sedation and neuromuscular blockade, may also have contributed to the likely worse outcomes during the period when the information was collected.

Given the high mortality rate, considerable functional consequences for survivors of long-term mechanical ventilation, as well as the intense symptoms experienced during hospitalization, it is worth discussing, based on complex bioethics, the affirmative response of the majority of patients when asked whether it was worth undergoing intensive care and whether they would undergo the same procedures again if necessary. A similar result was obtained in a French study conducted in 2000, also carried out in a single unit, in which, despite the decline in functionality after one year, of the 30 survivors, only five would not accept being admitted to the ICU again[23]. Another North American study showed that 84.7% of survivors of critical illnesses would also accept all the interventions carried out previously, once again, to avoid death. In this study, the authors believe that these responses were due to the loss of memory about the intensity and duration of the suffering experienced during the period of dependence on mechanical ventilation, since two thirds of the patients had no unpleasant memories of the period on artificial respiration[24].

From a bioethical point of view, three issues deserve to be addressed: non-discrimination, repercussions for oneself and others, and freedom to make decisions.

The data on mortality associated with the diagnosis of COVID-19 or not allows us to demonstrate that there was no positive or negative discrimination present, as there was no difference between the figures.

The answers given to the question of whether they would agree to experience ICU admission again, especially intubation, reflect the freedom to choose associated with physical integrity menaced by a life-threatening situation. The vulnerability associated with this situation may be a factor that influences this manifestation[25-27]. The broad acceptance found in this sample shows that patients and their families should always be included in the decision-making process. Professionals often make decisions which, according to their viewpoint, would be in the patient's best interests.

CONCLUSION

The data obtained retrospectively from a sample of medical records of 164 elderly patients who underwent long periods of mechanical ventilation during the COVID-19 pandemic showed a high in-hospital mortality rate and also in the 12-month follow-up period after hospital discharge. A higher degree of dependence was observed compared to the period before hospitalization and one year after discharge. Most of the surviving patients interviewed 12 months after discharge would agree to undergo again all the care procedures related to the time period they were on invasive mechanical ventilation.

These results deserve to be better compared with other samples of patients in similar care situations without a pandemic.

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