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Prolonged mechanical ventilation patient outcome after discharge from an intensive care unit

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***Keywords*— Critical Care, Patient Care, Prolonged Mechanical Ventilation.**

***Abstract*—** *Background: Mechanical ventilation (MV) is one of the pillars of therapy in the Intensive Care Unit (ICU) as many patients require ventilatory support. This study aimed to analyze the outcome of Prolonged Mechanical Ventilation (PMV) patients after discharge from an Intensive Care Unit (ICU). Methods: This is a retrospective cross-sectional study of 142 medical charts of patients admitted to an ICU and a Special Care Unit (SCU) in Brazil from 2012 to 2014. Results: Participants' mean age was 66.5 and the majority were men (58.5%). Outcome in the ICU was correlated with laparotomies before (p=0.043) and after (p=0.049) admission, sepsis (p=0.013), dialysis-requiring acute kidney injury (AKI) (p<0.001), and hemodynamic instability (p=0.003). Dialysis-requiring AKI (p=0.012), non-dialysis-requiring AKI (p=0.023) and atelectasis (p=0.045) during ICU stay were correlated with death in SCU patients. Only hemodynamic instability (p=0.002) and diarrhea (p=0.045) were correlated with outcome in the SCU. Additionally, 91 (64.1%) PMV patients in the ICU were discharged to the SCU, 50 (35.2%) died, and one (0.7%) was transferred to another hospital. Furthermore, 15 (16.5%) SCU patients were discharged to the Home Care Program and one (1.1%) was transferred to another hospital. Conclusions: PMV patients exhibited longer hospital stay and higher mortality. Dialysis-requiring AKI and hemodynamic instability were associated with increased risk of death. Only a few PMV patients were successfully discharged or referred to Home Care.*

I. INTRODUCTION

Intensive Care Units (ICUs) were created in the United States in the 1950's to provide modern techniques of prolonged mechanical ventilation. In Brazil, the first ICUs were created in the 1970's to provide quality and humanized care to critically ill patients – i.e., patients with impairments in one or more of the main physiological systems and loss of their control who, therefore, required continued care. Because of that, the ICU has been synonymous with severity and mortality [1,2]. Mechanical ventilation (MV) is one of the pillars of therapy in the ICU as many patients require ventilatory support. Is primarily aimed at reducing respiratory discomfort through maintenance of gas exchange, relief of respiratory muscle work and muscular fatigue, and reduction of oxygen consumption, which can facilitate the use of other therapies [3, 4, 5, 6].

Epidemiological studies of ICU patients have found 60% of medical charts indicating acute respiratory failure as the main cause of MV and a high mortality rate (74.5%) in people with advanced age and neurological and lung diseases, with most patients presenting a mean age of 60-76 years and past history of diseases of the circulatory system (56.2%), followed by endocrine, nutritional, and metabolic diseases (27.8%) and neoplasms (18.8%). Furthermore, patients submitted to MV exhibit mortality rates of 45% in the ICU and 47.93% in other hospital settings [4, 7, 8, 9].

Prolonged mechanical ventilation is defined as the need for MV for 21 consecutive days or more for more than 6 hours a day [10, 11]. The main complications arising from the use of MV are decreased cardiac output, acute respiratory alkalosis, elevated intracranial pressure, gastric distension, pneumonia, atelectasis, barotrauma, and bronchopleural fistula [12].

Ventilator-associated pneumonia (VAP) is a common complication in the ICU that is responsible for high mortality and dependence rates, thus prolonging the length of hospital stay and increasing hospital costs [13, 14].

The underlying disease, the length of MV, the etiology of respiratory failure, age, and smoking [6, 15], influences the progress and prognosis of patients submitted to MV.

Therefore, knowing the comorbidities and complications occurring during hospitalization and previous discharge from the ICU and their outcome (progress, death, and discharge) can contribute to a better understanding of the profile of patients submitted to PMV, thus facilitating the planning of actions aimed at early identification of patients. Given that, this study aimed to assess the progress and outcome of patients submitted to Prolonged Mechanical Ventilation in an Adult Intensive Care Unit and with previous discharge from a Special Care Unit.

II. METHODS

A retrospective and analytical cross-sectional study was carried out at a General Hospital in Northeastern Brazil. The hospital is part of the tertiary care network of the State of Ceará and serves the population covered by Brazil's Unified Health System (*Sistema Único de Saúde – SUS*). The hospital was the first public hospital in the North and Northeast regions to receive a Level 2 Hospital Accreditation from the National Accreditation Organization.

The hospital where the study took place has 336 beds distributed in the medical, surgical and pediatric departments and in the Special Care Unit (SCU) and adult Intensive Care Unit (ICU). It also offers outpatient and home care programs and special and personalized care to patients with chronic diseases, such as Diabetic foot and Stroke [16].

Our study included medical charts of patients admitted to the Adult Intensive Care Unit of the hospital who progressed to Prolonged Mechanical Ventilation from 2012 to 2014 and who continued their treatment in the Special Care Unit (SCU). The SCU receives patients who need continuing care. Information on patients' outcome (progress, death, discharge) over the last three years was provided by the SCU and used in our study.

We used data from the past three years as they were fully consolidated. Three professionals working in the adult ICU (Physician, Nurse and Physical Therapist) previously tested the data collection instrument. The professionals tested the instruments' capacity to organize the data transcribed from the medical charts. Data were collected directly from the medical charts of the patients admitted to the ICU and SCU.

The data collection instrument covered the following information: 1. Identification: chart number, age, gender, origin. 2. Clinical history: diagnosis at admission, comorbidities, life habits, previous surgeries, complications during hospitalization. 3. Treatment and complications and duration of mechanical ventilation, dialysis-requiring acute kidney injury (AKI), non-dialysis-requiring AKI, ventilator-associated pneumonia (VAP), respiratory distress syndrome (RDS), accidental

extubation, elective extubation failure, endotracheal reintubation (ETRI), and number of days spent in the ICU/Hospital. 4. Clinical outcome in the ICU (referral to SCU/death/referral to another hospital) and in the SCU (discharge to home/referral to the Home Care Program – HCP, referral to another hospital, and death). Figure 1 depicts the flow chart of the outcome of the patients analyzed in our study.

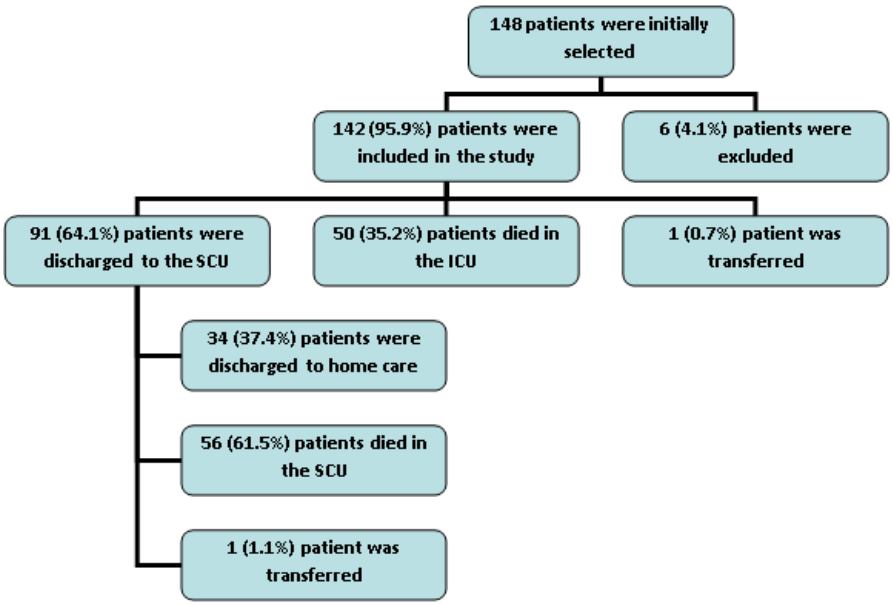

Fig.1 depicts the flow chart of the outcome of the patients analyzed in our study.

The duration of Mechanical Ventilation consisted of the period between Endotracheal Intubation (EI) and withdrawal of the ventilatory support with spontaneous breathing for at least 48 hours after extubation. Prolonged length of stay in the ICU considered in the present study was seven days or more, as defined in the hospital management contract by the Ceará Health Secretariat. Prolonged mechanical ventilation consisted of mechanical ventilation for 21 days or more for more than 6 hours a day [10].

The study included fully completed medical charts of patients who progressed to Prolonged Mechanical Ventilation from 2012 to 2014. Incomplete and illegible medical charts were excluded. In all, six of the 148 medical charts were excluded due to data incompleteness. Thus, the final sample includes 142 medical charts.

The data were organized in tables and graphs using 2013 Microsoft Office Excel® spreadsheets. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0 for Windows (SPSS Inc., Chicago, IL, USA).

Quantitative variables were described as means, standard deviations, and absolute and percentage frequencies. A bivariate analysis was performed using the Mann-Whitney test, the Kruskal-Wallis test, and the Spearman's correlation for numerical variables and the Pearson's Chi-square test for categorical variables. All tests were performed using a statistical significance level of 5%.

The study was approved by the Research Ethics Committee of the University of Fortaleza (UNIFOR) (Approval No. 1.013.436).

III. RESULTS

A total of 142 medical charts were analyzed. The patients' age ranged 17 to 103 years (mean of 66.5±18.7). There was a higher percentage of people under 59 years of age (28.9%). However, longevity was pronounced in the study population as 38 (26.8%) patients were aged 80 years and older. There was a predominance of men (83; 58.5%) compared with women (59; 41.5%) and 82.4% (n=117) of the patients came from other health care facilities.

Table 1 shows the data collected from the medical charts, including clinical diagnosis and comorbidities at admission to the adult ICU and the SCU in the period from 2012 to 2014. Respiratory failure caused by community-acquired pneumonia (PAC) was the main diagnosis at admission (78; 54.9%). The main comorbidities were hypertension (77; 54.2%), heart

disease (49; 34.5%), diabetes (46; 32.4%), and neurological sequelae (28; 19.7%).

Only 108 charts contained information on bad habits. Smoking was reported in 58 (53.7%) charts, drinking was described in 47 (43.5%) charts and use of illicit drugs was reported in 3 (2.8%) charts. Acute Respiratory Failure (ARF) was the main cause of mechanical ventilation in the patients analyzed (128; 90.1%).

Table 1. Clinical diagnosis, comorbidities and cause of mechanical ventilation at admission to the adult ICU and SCU from 2012 to 2014. Fortaleza, Ceará, 2016.

Variables	***N***	***%***
Diagnosis at admission		
CAP – Community-acquired pneumonia and respiratory failure	78	54.9
PNA – Pneumonia	54	38.0
Stroke	27	19.0
Sepsis	21	14.9
Renal failure	18	12.7
COPD – Chronic obstructive pulmonar disease	12	8.5
Septic shock	10	7.0
UTI – Urinary tract infection	8	5.6
Laparotomy	8	5.6
AMI – Acute myocardial infarction	7	4.9
Sensory impairment	7	4.9
Pancreatitis	6	4.2
APE – Acute pulmonary edema	6	4.2
CRA – Cardiorespiratory arrest	5	3.5
PE – Pulmonaary embolism	5	3.5
Pulmonary tuberculosis	5	3.5
HIV retrovirus – Human Immunodeficiency Virus	4	2.8
Cardiogenic shock	3	2.1
Comorbidities		
Hypertension	77	54.2
Heart disease	49	34.5
Diabetes	46	32.4
Neurological sequelae	28	19.7
COPD	21	14.8
Obesity	11	7.7
Malnutrition	11	7.7
Cancer	11	7.7
Dialysis-requiring AKI	6	4.2
Non-dialysis-requiring AKI	6	4.2
Liver disease	4	2.8
HIV AIDS	2	1.4
Respiratory failure	2	1.4
Nephropathy	1	0.7
Cause of mechanical ventilation		
ARF- Acure respiratory failure	128	90.1
Surgery	7	4.9

Hemodynamic instability	4	2.8
Unknown	3	2.2

Source: own construction

In all, 22 (15.5%) patients had undergone some type of surgery before admission to the unit. Surgeries were mainly laparotomy (9; 40.9%) and heart surgeries (3; 13.6%). Similarly, 36 (25.4%) MV patients underwent surgeries after admission to the unit, with laparotomy being the most predominant type of surgery (20; 55.6%).

Table 2 shows the types of complications in the adult ICU. The most common complications in the ICU were sepsis (64.1%), dialysis-requiring AKI (53.5%) and ventilator-associated pneumonia (35.2%). The most common complications in the SCU were sepsis (30.2), ventilator-associated pneumonia (23.8%) and urinary tract infection (20.6%).

Table 2. Complications in the adult ICU and SCU from 2012 to 2014. Fortaleza, Ceará. 2016.

Complications in the ICU	***N***	***%***
Sepsis	91	64.1
Dialysis-requiring AKI	76	53.5
VAP – Ventilator-associated pneumonia	50	35.2
Endotracheal Reintubation	19	13.4
Pleural Effusion	17	12.0
Circulatory Shock	17	12.0
AF – Atrial Fibrilation	17	12.0
Thrombocytopenia	15	10.6
CRA – Cardiorespiratory arrest	14	9.9
Pneumothorax	13	9.1
Bleeding	11	7.7
Non-dialysis-requiring AKI	10	7.0
Atelectasis	10	7.0
Critically illness polyneuropathy	9	6.3
UTI – Urinary tract infection	9	6.3
Stroke	9	6.3
ARDS – Acute Respiratory Distress Syndrome	8	5.6
Accidental extubation	8	5.6
Hemodynamic instability	8	5.6
Hemorrhage	7	4.9
Tracheostomy tube change	7	4.9
Leukopenia	6	4.2
Extubation failure	4	2.8
Edema	3	2.1
Pressure ulcers	3	2.1
Complications in the SCU		
Sepsis	19	30.2
VAP – Ventilator-associated pneumonia	15	23.8

UTI – Urinary tract infection	13	20.6
Hemodynamic instability	13	20.6
CRA – Cardiorespiratory arrest	8	12.7
Septic shock	5	7.9
Diarrhea	5	7.9
Eschar caused by pressure ulcer	3	4.8
Sensory impairment	3	4.8
Bleeding tracheostomy	3	4.8

Source: own construction

Table 3 depicts the mean duration (in hours) of endotracheal intubation, the mean duration (in days) of mechanical ventilation, the mean duration of ICU stay, and the mean duration of hospital stay from 2012 to 2014. The duration of mechanical ventilation was not significantly correlated with the duration of endotracheal intubation (p=0.967).

Table 3. Duration of intubation (in hours), mechanical ventilation (in days), ICU stay (in days) and hospital stay (in days) from 2012 to 2014. Fortaleza, Ceará, 2016.

Variables	n (%)	Mean	Median	Standard error	Mín-Max
Duration of intubation (hours)	134 (94.4)	16.5	15.0	8.0	3 – 65
Duration of MV (days)	141 (99.3)	64.3	48.0	53.9	21 – 401
Duration of ICU stay (days)	142 (100)	37.0	31.5	21.9	2 – 144
Duration of hospital stay (days)	142 (100)	80.2	71.0	59.3	12 – 398

Source: own construction.

Table 4 shows that acute myocardial infarction, sensory deficits, liver disease, non-dialysis-requiring AKI, ventilator-associated pneumonia and cardiorespiratory arrest were significantly associated (p<0.05) with the mean duration of mechanical ventilation.

Table 4. Bivariate analysis of the characteristics of clinical diagnosis at admission, comorbidities and complications in the ICU in relation to the mean duration of MV from 2012 to 2014. Fortaleza, Ceará, 2016.

	Variables	Mean duration of MV ± SD	P value
Diagnosis at admission	Acute myocardial infarction		**0.014**
	Yes	96.1 ± 41.4	
	No	62.7 ± 54.1	
	Sensory impairment		**0.016**
	Yes	36 ± 26.0	
	No	65.8 ± 54.6	
Comorbidity	Liver disease		**0.012**
	Yes	111.5 ± 31.8	
	No	62.9 ± 53.9	
Complications	Non-dialysis-requiring AKI		**0.021**

in the ICU	Yes	87.9 ± 13.7	
	No	62.7 ± 4.7	
	Ventilator-asociated pneumonia		**0.014**
	Yes	70.9 ± 5.6	
	No	60.7 ± 6.3	
	Cardiorespiratory arrest		**0.024**
	Yes	92.9 ± 15.4	
	No	61.2 ± 4.7	

Source: own construction. *p = significance level for Mann-Whitney U test; $\bar{x}$ = mean; sd = standard deviation.

There was a significant association between the outcome in the ICU and laparotomies before (p=0.043) and after admission (p=0.049). Table 5 shows that 47 of the 56 deaths that occurred as an outcome in the SCU were associated with different pathological complications. The following ICU complications were significantly associated with patient outcome in the ICU (death/discharge): sepsis (p=0.013), dialysis-requiring AKI (p<0.001), and hemodynamic instability (p=0.003).

Some ICU complications were significantly associated with patient outcome (death/discharge) among the patients discharged to the SCU (n=90). Dialysis-requiring AKI (p=0.012), non-dialysis-requiring AKI (p=0.023) and atelectasis (p=0.045) were associated with death. As for complications in the SCU, only hemodynamic instability (p=0.002) and diarrhea (p=0.045) were significantly associated with patient outcome.

Table 5. Analysis of the association of complications in the ICU (n=141) and SCU (n=90) with patient outcome from 2012 to 2014. Fortaleza, Ceará. 2016.

Place where the complication occurred	Complications	Patient outcome		p value*
		Death	Discharge	
Outcome in the ICU (n=141)				
Adult ICU	Sepsis			**0.013**
	Yes	39 (42.9)	52 (57.1)	
	No	11 (22.0)	39 (78.0)	
	Dialysis-requiring AKI			**<0.001**
	Yes	37 (48.7)	39 (51.3)	
	No	13 (20.0)	52 (80.0)	
	Hemodynamic instability			**0.003**
	Yes	7 (87.5)	1 (12.5)	
	No	43 (32.3)	90 (67.7)	
Outcome in the SCU (n=90)				
Adult ICU	Dialysis-requiring AKI			**0.012**
	Yes	30 (76.9)	9 (23.1)	
	No	26 (51.0)	25 (49)	
	Non-dialysis-requiring AKI			**0.023**
	Yes	2 (25.0)	6 (75)	
	No	54 (65.9)	28 (34.1)	
	Atelectasis			**0.045**

	Yes	1 (20.0)	4 (80)	
	No	55 (64.7)	30 (35.3)	
SCU	Hemodynamic instability			**0.002**
	Yes	13 (100)	-	
	No	43 (55.8)	34 (44.2)	
	Diarrhea			**0.045**
	Yes	1 (20.0)	4 (80)	
	No	55 (64.7)	30 (35.3)	

Source: own construction. *p<0.05 = significance level for the chi-squared test.

The outcomes of the 142 patients who underwent MV in the ICU were as follows: 91 (64.1%) were discharged to the SCU, 50 (35.2%) died, and one patient (0.7%) was transferred to another hospital.

According to information collected from the medical charts, of the 106 (74.6%) patients who died, 50 (35.2%) had been submitted to MV in the ICU and 56 (61.5%) had been discharged to the Special Care Unit (SCU). In all, one (1.1%) ICU patient was transferred to another hospital and 19 (20.9%) SCU patients were discharged from the hospital. In addition, 15 (16.5%) SCU patients were discharged to the Home Care Program and one SCU patient (1.1%) was transferred to another hospital.

IV. DISCUSSION

The present study sought to analyze the profile of patients admitted to an Adult Intensive Care Unit (ICU) and Special Care Unit (SCU) of a large hospital in Brazil. Age was an important variable in our study. There was a higher percentage of people under 59 years of age (28.9%). However, longevity was pronounced in the study population as 38 (26.8%) patients were aged 80 years and older. This finding is in agreement with other studies that have found similar percentages – 25%-31.5% of people aged under 59 years and 20.8%-27.1% of people aged 80 years and over [17, 18].

The predominance of men (58.5%) in our study is corroborated by other authors who found that more men are admitted to the ICU [19]. Additionally, the number of men admitted to ICU in different countries is considerably higher than that of women [20].

Respiratory failure caused by community-acquired pneumonia (PAC) was the main diagnosis at admission (54.9%). These findings are similar to those found in Taiwan, where heart and lung diseases were found in 50% of the patients submitted to PMV and hypertension, Diabetes and neurological sequelae were the most prevalent comorbidities [21].

Guidelines of the Brazilian Society of Pulmonology and Phthisiology mention that community-acquired pneumonia is the acute infectious disease with the greatest social and medical impact on morbidity and costs related to treatment. They also mention that diseases of the respiratory system are the fifth leading cause of death in Brazil, with pneumonia being the second most frequent. There is an upward trend in hospital mortality rate that points to several hypotheses, such as the hospitalization of more severe cases of pneumonia and the aging of the population [22].

Researchers have pointed out that the different clinical manifestations and degrees of severity of pneumonia are challenges in emergency care centers [23]. Therefore, early diagnosis and classification of patients based on severity criteria are key to the treatment in a hospital setting. Furthermore, the need for admission to an intensive care unit (ICU) should be carefully assessed.

The information collected from the medical charts revealed high rates of comorbidities such as hypertension (54.2%), heart disease (34.5%), diabetes (32.4%) and neurological sequelae (19.7%). It should be noted that 56 deaths were associated with different pathological complications shown in Table 5.

Information on patient characteristics and outcome in patients requiring mechanical ventilation (MV) is critical for better use of resources and clinical decision making in the ICU. A study of 505 patients on MV in India found that 76.4% of the participants presented comorbidities and that primary causes of MV were sepsis and neurological, cardiac, renal and respiratory diseases. Furthermore, the study found that hypertension and diabetes were the most common comorbidities [24]. Similarly, prolonged postoperative mechanical ventilation was required by 10-20% of cardiac surgery subjects, who constitute a specific group that represents most of the

postoperative mortality, which is associated with multiple organ failure and sepsis [25].

The neurological sequelae (19.7%) observed at admission in our study should be highlighted. Researchers have drawn attention to the effect of neuromuscular dysfunctions on the outcome of MV, which are risk factors for difficult weaning. In their study, 33% of the patients with polyneuropathy failed weaning trials and finally died [26].

Attention should be paid to the high rate of smokers (53.7%) found in our research. Smoking is the leading cause of preventable death (World Health Organization [27]. Thus, it should be noted that the main cause of mechanical ventilation was Acute Respiratory Failure (90.1%), which may have been caused by tobacco use.

In addition to being a major cause of mechanical ventilation, Acute Respiratory Failure can lead to several complications and increase the risk of morbidity and mortality in critically ill patients. MV patients with lung diseases have a significantly higher mortality rate than those without lung diseases [28].

A total of 15.5% of the patients in our study had undergone some type of prior surgery before admission to the ICU. Laparotomy was the most common type of surgery (40.9%). After admission to the adult ICU, 25.4% of these patients underwent new surgeries, with laparotomy being, again, the most common type of surgery (55.6%). These findings agree with a study that found that 63.1% of the patients analyzed had undergone laparotomy [29]. Other researchers have emphasized that the rate of complications following emergency laparotomies is greater in comparison with elective laparotomies, and that the most common problems are pain, postoperative fever, wound infection, nausea and vomiting in the postoperative period [30].

It should be noted that prior surgery (laparotomy) before and after admission to the ICU was significantly associated with patient outcome (death or discharge). Of the patients who died, 66.7% had undergone previous laparotomy ($p=0.043$) and 55% had undergone laparotomy during hospitalization in the adult ICU ($p=0.049$).

Sepsis (64.1%), dialysis-requiring AKI (53.5%) and ventilator-associated pneumonia (35.2%) were the most common complications in the adult ICU in the present study. Complications of sepsis are a cause of great concern, as they are the main causes of death in the ICU and one of the leading causes of death in general in the United States of America [31].

Researchers have investigated the association of comorbidities and colonization status with outcomes in patients requiring prolonged mechanical ventilation using comorbidity burden documented from pre-admission data. The outcomes studied included transfer back to acute care facilities, stay, and ventilator weaning status. Within 60 days, 58.6% of the patients were transferred back to an acute care facility. The most common reason for transfer was infection/sepsis (37%) [32].

Pneumonia is one of the main nosocomial infections in the ICU and ventilator-associated pneumonia is the most common infection in hospitalized patients with an incidence rate ranging 9%-68% depending on the diagnostic method used and the population studied [33]. Because of that, many measures have been successfully implemented to prevent ventilator-associated pneumonia. One of these measures was the creation of protocols within the ICU that should be used in a multidisciplinary manner and audited by the Hospital Infection Control Services [34].

The use of specific strategies focused on the prevention of nosocomial infections in addition to standard precautions should be based on specific transmission in critically ill patients. The most common infections in these patients are ventilator-associated pneumonia, catheter-related bloodstream infection, and urinary tract infection. Therefore, it is necessary to periodically drain and discard any condensate that accumulates in the tubes of a mechanical ventilator [35].

A total of 74.6% of the patients who were hospitalized in the years analyzed in our study died. Other researchers also found a 74.6% mortality rate, thus supporting the findings of our study [7]. It should be noted that the percentage of people over 60 years of age and the severity of the patients hospitalized in the units where the present study took place might have significantly influenced such rate.

Acute myocardial infarction, sensory impairment, non-dialysis-requiring AKI, ventilator-associated pneumonia and cardiorespiratory arrest were statistically associated ($p<0.05$) with the duration of mechanical ventilation. These findings draw attention to the population aging. In the older population, AKI considerably enhances the effects of ICU hospitalization, thus reducing the chances of weaning and often leading to death. In addition, multiple comorbidities such as diabetes, heart disease and pre-existing kidney injury are associated with the development of prolonged mechanical ventilation [21].

In our study, the analysis of the association of complications in the adult ICU, comorbidities and

complications outside the ICU with outcome in the SCU revealed that only AKI (p=0.012) and hemodynamic instability (p=0.002) were significantly associated with the outcome in the SCU. Patients with kidney injury who require PMV have a very poor prognosis. In the ICU, the combination of mechanical ventilation and renal replacement therapy was found to be associated with prolonged hospital stay, high cost of care and poor outcome. In addition, none of the patients with severe renal impairment survived one year after discharge [36].

Sepsis, dialysis-requiring AKI and hemodynamic instability were associated with the outcome (death/discharge) in our study. A recent study found that severe sepsis/septic shock, acute respiratory distress syndrome (ARDS), atelectasis and infection with drug-resistant pathogens were mostly common in the ventilator-associated pneumonia group [37].

Another study that assessed AKI outcome found that 22.5% of patients presented renal function recovery, 5.6% of patients remained on dialysis after 30 day, and 71.9% of patients died. In addition, age and focus abdominal sepsis were identified as risk factors for death and urine output and negative fluid balance were identified as protective factors [38].

ORIGINAL ARTICLE

Assessment of risk factors responsible for difficult

weaning from mechanical ventilation in adults

ORIGINAL ARTICLE

Assessment of risk factors responsible for difficult

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The small sample size is a limitation of the present study. However, it should be noted that the sample size was affected by the number of medical charts excluded from the research due to missing or inaccurate information. Given that, we emphasize the importance of completing medical charts with accurate clinical and hospital information as they can be used in research. Furthermore, it should be noted that as the present study analyzed patients from only one hospital, its findings cannot be extrapolated. However, the hospital where the research took place is a large reference hospital and, therefore, the same results may be found in other places. Our study is expected to draw attention to the magnitude of the problem and contribute to the planning of preventive and rehabilitation measures targeted at patients in hospital settings.

V. CONCLUSION

Patients who remained under prolonged mechanical ventilation exhibited longer hospital stay and higher mortality. Complications such as dialysis-requiring AKI and hemodynamic instability were significantly associated with increased risk of death in MV patients. Only a small percentage of the patients submitted to Prolonged Mechanical Ventilation were successfully discharged or referred to Home Care.

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