THE USE OF PORTABLE VENTILATORS ADAPTED TO TRACHEOSTOMY IN CLINICAL PRACTICE

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ABSTRACT: Introduction: Introduction: The use of portable ventilators (PV) adapted to tracheostomy has been observed in critical patients in clinical practice. Objective: The study aimed to identify the characteristics associated with the indication for PV, patient outcomes, and survival. Methods: This was a prospective cohort study conducted with adult tracheostomized patients. Data collected included demographics, severity scores, reasons for ICU admission and intubation, days of mechanical ventilation (MV) until tracheostomy, cause of tracheostomy, and outcomes (ICU and hospital). Univariate analysis compared the groups with and without PV. Odds ratios (OR) assessed the likelihood of PV use, and age-adjusted logistic regression evaluated associated variables. Hospital survival was studied using the Kaplan-Meier method. Results: A total of 95 patients were included. The mean age was 71 years, with 58% being female. The median SAPS II was 55, and the Charlson Comorbidity Index was 4. Patients with an indication for PV (n=71) were older and had a longer continuous sedation time. Those intubated due to acute respiratory failure had a lower chance of using PV than those intubated for other causes. Hospital survival was higher in the PV group; however, the hospital mortality rate did not differ between the groups. Conclusion: PV use in tracheostomized patients was greater in the elderly and those intubated due to neurological causes or COPD. Despite higher survival, the similar hospital mortality rate suggests the need for further interventions. The literature reinforces that a multidisciplinary approach is essential to manage the complex dysfunctions in these patients with prolonged hospitalization.
KEYWORDS: Tracheostomy; Ventilator weaning; Noninvasive ventilation.

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O USO DE VENTILADORES PORTÁTEIS ADAPTADOS À TRAQUEOSTOMIA NA PRÁTICA CLÍNICA

RESUMO: Introdução: O uso de ventiladores portáteis (VP) adaptados à traqueostomia tem sido observado em pacientes críticos. Objetivo: identificar as características associadas à indicação de VP, os desfechos e a sobrevida. Métodos: Este foi um estudo de coorte prospectivo realizado com pacientes adultos traqueostomizados. Foram coletados dados demográficos, escores de gravidade, motivos da admissão na UTI e intubação, dias de ventilação mecânica (VM) até a traqueostomia, causa da traqueostomia e desfechos (UTI e hospitalar). A análise univariada comparou os grupos com e sem VP. A razão de chances avaliou a chance de uso de VP, e a regressão logística ajustada por idade avaliou variáveis associadas. A sobrevida hospitalar foi estudada pelo método de Kaplan-Meier. Resultados: Foram incluídos 95 pacientes. A idade média foi de 71 anos, 58% do sexo feminino. A mediana do SAPS II foi 55 e do índice de Charlson foi 4. Pacientes com indicação para VP (n=71) eram mais velhos, com maior tempo de sedação contínua. Aqueles intubados por insuficiência respiratória aguda tiveram menor chance de utilizar VP do que por outras causas. A sobrevida hospitalar foi maior no grupo com VP, porém, a taxa de mortalidade hospitalar não diferiu entre os grupos. Conclusão: O uso de VP em pacientes traqueostomizados foi maior em idosos, intubados por causas neurológicas e DPOC. Apesar da maior sobrevida, a taxa de mortalidade hospitalar semelhante sugere a necessidade de mais intervenções. A literatura reforça que a abordagem multidisciplinar é essencial para gerenciar as disfunções complexas desses pacientes com hospitalização prolongada.
PALAVRAS-CHAVE: Traqueostomia; Desmame do ventilador; Ventilação não invasiva.

EL USO DE VENTILADORES PORTÁTILES ADAPTADOS A LA TRAQUEOSTOMÍA EN LA PRÁCTICA CLÍNICA

RESUMEN: Introducción: En la práctica clínica, se ha observado el uso de ventiladores portátiles (VP) adaptados a traqueostomía en pacientes críticos. Objetivo: El estudio tuvo como objetivo identificar las características asociadas a la indicación de VP, la evolución clínica y la supervivencia. Métodos: estudio de cohorte prospectivo con pacientes adultos traqueostomizados. Los datos recopilados incluyeron información demográfica, puntuaciones de gravedad, motivos de ingreso en la UCI e intubación, días de ventilación mecánica (VM) hasta la traqueostomía, causa de la traqueostomía y evolución clínica (UCI y hospital). El análisis univariante comparó los grupos con y sin VP. Se calculó la razón de momios para evaluar la probabilidad de uso de VP y se realizó una regresión logística ajustada por edad. La supervivencia hospitalaria se estudió mediante el método de Kaplan-Meier. Resultados: Se incluyeron 95 pacientes. La edad media fue de 71 años, con un 58% de mujeres. La mediana del SAPS II fue de 55 y el Índice de Comorbilidad de Charlson fue de 4. Los pacientes con indicación de VP (n=71) eran de mayor edad y requirieron una sedación continua más prolongada. Aquellos intubados por insuficiencia respiratoria aguda tuvieron menor probabilidad de requerir VP que aquellos intubados por otras causas. La supervivencia hospitalaria fue mayor en el grupo con VP; sin embargo, la tasa de mortalidad hospitalaria no difirió entre los grupos. Conclusión: El uso de VP fue mayor en los ancianos y en aquellos intubados por causas neurológicas o EPOC. A pesar de la mayor supervivencia, la tasa de mortalidad hospitalaria similar sugiere la necesidad de intervenciones adicionales. La literatura refuerza la importancia

de un abordaje multidisciplinario para el manejo de las disfunciones complejas en estos pacientes con hospitalización prolongada.
PALABRAS CLAVE: Traqueotomía; Destete del ventilador; Ventilación no invasiva.

1. INTRODUCTION

Tracheostomy is a common surgical procedure in patients under mechanical ventilation (MV). The prevalence of tracheostomy in intensive care unit (ICU) patients reported in the study by Frutos-Vivar *et al*. (2005), according to the geographical area, is as follows: Europe, 12.2%, Latin America 9.3%, and United States (US) and Canada, 9.3%. However, the prevalence can be as high as 59% if considering the patients who remain in the ICU for more than 14 days (Arabi *et al*., 2009). Another epidemiological study, excluding cases related to head and neck cancer, reported the annual rate of tracheostomy among US adults hospitalized with respiratory failure and invasive mechanical ventilation. An estimated 958,856 (9.4%) had an ICD code for tracheostomy, with an annual mean of 9.6%. This changed over the study period from 10.4% in 2002, to a peak of 10.9% in 2004, to a nadir of 7.4% in 2017 (Abril *et al*., 2021).

Prolonged orotracheal intubation increases the risk of ventilator-associated pneumonia (VAP) because it bypasses and disables laryngeal mechanisms, which facilitates contamination of the respiratory system. Prolonged orotracheal intubation can also be associated with the development of sinusitis and laryngeal and tracheal lesions. The placement of a tracheostomy cannula has become an alternative to prolonged intubation, with the benefits of improving patient comfort, reducing the need for sedation, decreasing airway resistance, and facilitating care (Rose; Messer, 2024).

In patients with chronic respiratory disease, particularly those who are difficult to wean, the value of NIV in facilitating weaning is clear. In patients without chronic respiratory disease, the use of NIV should be limited to units with a multidisciplinary weaning team with clinical expertise and established clinical protocols (Rose; Messer, 2024). According to a review published by Guia *et al*. (2021), although there is an increasing number of reports that incorporate NIV for weaning patients with tracheostomy, most studies apply NIV with a facial interface, with the tracheostomy tube capped. This seems to facilitate the transition from ventilatory support and eventual decannulation. Additional research is needed to develop weaning protocols and to compare the use of NIV with other weaning approaches and strategies in this population.

The treatment of patients who remain total or partially dependent on ventilatory support is multidisciplinary. In some countries, services such as weaning centers and post-critical rehabilitation centers are available (Fradkin *et al*., 2024). However, in Brazil, this type of service is exceedingly scarce and consequently, these patients remain hospitalized for long periods. One of the strategies that some Brazilian hospitals have adopted is the use of NIV equipment adapted to the tracheostomy in ICU patients for subsequent discharge to the ward, to proceed with gradual weaning. According to Ibrahim *et al*. (2012), this "modality" of NIV use has increased in individuals chronically dependent on MV. The main objective of this strategy is to enable early discharge from the ICU which might be interesting in times of ICU beds scarcity such as nowadays with the COVID-19 pandemic.

In 2023, Liu and Shi published a systematic review, in which they identified only 72 cases of patients who used portable ventilators (PV) connected to a tracheostomy. The main diagnoses included neuromuscular disease, chronic obstructive pulmonary disease (COPD), pneumonia, and congenital central hypoventilation syndrome. Indications included dysfunctional response to ventilator weaning, apnea, and cyanosis. The clinical outcomes were as follows: 33 patients were weaned, 24 patients were maintained on home MV, and 15 died. This systematic review demonstrated the scarcity of studies on the use of PV connected to tracheostomies, despite it being a routine practice in some hospitals.

We have observed that some tracheostomized patients, after a period of conventional mechanical ventilation (MV), received ventilatory support with PV, which are usually used for non-invasive ventilation (NIV). After the adaptation period, the patients who adapted were generally discharged to the ward with the device and were gradually weaned off this ventilatory support. Other patients remained on conventional MV and were weaned with progressive nebulization periods. This observation raises a question about what the possible indications for choosing the weaning method for tracheostomized patients in the Intensive Care Unit (ICU) would be. There is little data in the literature regarding the use of PV in tracheostomized patients.

The objective of this study was to identify the factors or characteristics associated with the indication for the use of PV connected to the tracheostomy as ventilatory support. For this purpose, the two groups of tracheostomized patients in the ICU were compared: those using PV and those who remained on conventional mechanical ventilation (without

PV). Furthermore, we aimed to analyze hospital survival of patients with tracheostomies, according to whether or not a PV was used.

2. METHODS

This is a prospective study that was carried out in two general ICUs, with 42 beds, of a hospital in the State of Sao Paulo, Brazil. The sample for this study was selected by convenience (non-probabilistic) criteria, consisting of individuals consecutively admitted to the units studied. Data were collected from August 2018 to August 2019. This study was approved by the Ethics Committee (CAAE 88064518.9.0000.5505).

2.1 Participants

All adult patients who underwent tracheostomy in the ICU were considered for inclusion. Patients whose legal guardians did not authorize data collection and patients who died before obtaining consent were excluded. The patients included in the study were monitored until hospital discharge or death. The data sources were the patients' electronic records.

Data collected were demographic variables; Simplified Acute Physiologic Score II (SAPS II); Charlson comorbidity index; reason for ICU admission (medical or surgical); diagnosis (defined according to the main affected system as respiratory, gastrointestinal, trauma, neurological, or general surgery, or others); reason for intubation (COPD, asthma, neurological depression, neuromuscular disease, or acute respiratory failure); total days of continuous sedation, total time of conventional mechanical ventilation; and total number of days of ventilatory support (conventional and PV). Regarding tracheostomy, the variables collected were the cause of tracheostomy and duration of MV until tracheostomy.

2.2 Portable ventilation use in tracheostomized patients

After at least 24-hours of pressure support ventilation on the UTI mechanical ventilator, the use of the portable ventilation could be started according to the intensive care physician decision. The equipment used was the Stellar ventilator® 100/150 ResMed®. The settings were adjusted by the physiotherapists in accordance with the medical team.

2.3 Outcomes

The outcome variables of the study were: duration of ICU and hospital stay; ICU and hospital mortality.

2.4 Statistical analysis

Descriptive analysis was performed, in which categorical data were presented as proportions and numerical data as means and respective standard deviations, or medians and interquartile ranges. To compare the groups with and without VP, univariate analysis was performed, in which categorical variables were compared with the chi-square test or Fisher's exact test, and continuous variables were compared with the t-test or nonparametric equivalent. To assess which characteristics or factors are associated with a higher likelihood of using portable ventilation after tracheostomy, the odds ratio of the categorical variables was calculated. The variables diagnosis and reason for intubation were dichotomized for analysis as follows: respiratory versus non-respiratory diagnosis and reason for intubation (acute respiratory failure versus other causes. After the univariate analysis, age-adjusted logistic regression analysis was performed to assess which independent variables might be associated with the use of portable ventilation. To study patients' hospital survival time, considering the use or nonuse of PV, the Kaplan-Meier estimator was used for survival curves and the Peto-Prentice log-rank test for comparisons between groups. For all proposed tests, a p-value ≤ 0.05 was considered significant.

3. RESULTS

During the study period, 2017 patients were admitted to the ICU, of which 1558 (77%) survived and were transferred to the ward. A total of 123 (6%) patients underwent tracheostomy, of which 95 were included in the study (Figure 1).

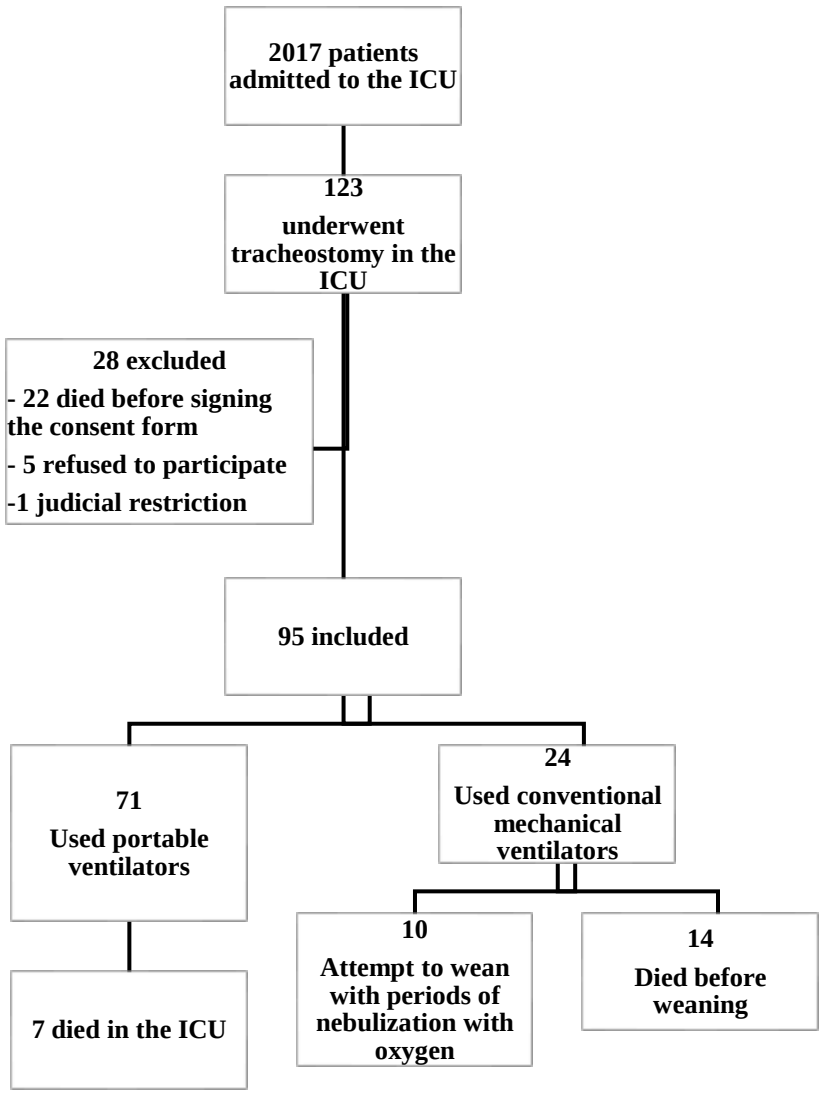

Figure 1. Study's population flowchart
Source: Prepared by the authors (2025).

The sample was predominantly of elderly patients, with more than half of the female sex. The severity assessed by SAPS II reveled an estimated probability of hospital death of approximately 57.5%. The evaluation of comorbidities using the Charlson index showed that the sample had approximately 21% of estimated survival over the next 10 years (Table 1). Regarding the reason for ICU admission, most patients were medical and the main diagnoses were respiratory and neurological. In accordance with reasons for ICU admission, the main causes of orotracheal intubation were acute respiratory failure, followed by central nervous system depression due to neurological or metabolic issues, and COPD exacerbation. The median time of continuous sedation was five days and 25% of the patients remained sedated for more than 10 days. The main reasons for

tracheostomy indication were the use of prolonged mechanical ventilation and difficult weaning (Table 1).

In comparing the groups, it was observed that the patients who were indicated for PV were older and had a longer duration of continuous sedation, and patients intubated due to acute respiratory failure showed a lower proportion of PV use than patients intubated for COPD and neurological causes (table 1).

Table 1. Sample characteristics, according to the use or not of portable ventilation - PV

Variables	**Total N=95**	**With PV N = 71**	**Without PV N = 24**	**P**
Age, years, mean (SD)	67(16)	68 (17)	62 (14)	0.040[a]
Female sex, n (%)	52 (55)	41 (58)	11 (46)	0.311[b]
SAPS II, mean (SD)	55 (16)	55 (17)	55 (14)	0.983 [c]
Charlson index, mean (SD)	4.6 (2.6)	4.5 (2.7)	4.9 (2.5)	0.290 [a]
ICU admission reason, n (%)				
Clinical	86 (90.5)	65 (91)	21 (87)	0.688[d]
Surgical	9 (9.5)	6 (9)	3 (13)	
Diagnosis, n (%)				
Respiratory	50 (53)	36 (49)	14 (58)	0.486 [b]
Gastrointestinal	6 (6)	3 (4)	3 (12)	
Trauma	3 (3)	2 (3)	1 (4)	
General surgery	6 (6)	4 (6)	2 (8)	
Neurological	19 (20)	17 (24)	2 (8)	
Others	11 (12)	9 (13)	2 (8)	
Reason for intubation, n (%)				
COPD	8 (8)	8 (11)	0 (0)	0.002 [b]
Asthma	1 (1)	1 (1)	0 (0)	
CNS depression	22 (23)	20 (28)	2 (8)	
Neuromuscular disease	1 (1)	1(1)	0(0)	
ARF	63 (66)	41 (58)	22 (92)	
Days of continuous sedation. median (IQR)	6 (2-11)	5 (2-10)	10 (3-13)	0.036 [a]
Days of conventional MV, mean (SD)	17 (8)	16 (7.8)	18 (9.7)	0.310 [a]
MV days until tracheostomy, mean (SD)	9.8 (4.8)	9.4 (4.7)	11 (5)	0.124 [a]
Early tracheostomy, n (%)	31 (33)	25 (35)	6 (25)	0.454 [d]
Cause of tracheostomy				
Prolonged MV with difficult weaning	74 (78)	55 (77.5)	19 (79)	
Other causes	21 (22)	16 (22.5)	5 (21)	1.000 [d]
Main outcomes				
ICU length of stay, days, mean (SD)	22(12)	22(12.5)	20.5 (11)	0.552[a]
Hospital length of stay, days, median (IQR)	41 (26-64)	45 (32-72)	27,5 (21-43)	0,005[a]
ICU mortality, n (%)	24 (25)	7 (10)	17 (71)	<0,001[d]
Hospital mortality, n (%)	80 (84)	59 (83)	21 (87,5)	0,753[d]

PV, Portable Ventilation; SD, Standard Deviation; SAPS II, Simplified Acute Physiology Score; ICU, Intensive Care Unit; COPD, Chronic Obstructive Pulmonary Disease; CNS, Central Nervous System; ARF, Acute Respiratory Failure; MV, Mechanical Ventilation; [a]Mann-Whitney test; [b]Chi-square test; [c] Student's T-test; [d] Fisher's exact test; *NA - not analyzed.

Odds ratios were calculated for each categorical study variable to verify possible associations with the use of portable ventilation. Patients intubated due to ARF had lower chance to use PV (table 2).

Table 2. Odds ratios for the occurrence of portable ventilation use in relation to the variables under study.

Variables	Odds Ratio (95% Confidence interval)
Female sex	1,60 (0.63-4.18)
ICU admission reason (medical)	1.57 (0.29-6.76)
Diagnosis (respiratory vs. non-respiratory)	0.69 (0.27-1.79)
Reason for intubation (ARF vs. other causes)	0.13 (0.02-0.51)
Reintubation	1.21 (0.47-3.19)
Cause of tracheostomy (prolonged MV vs. other causes)	0.92 (0.26-2.76)
Early tracheostomy	1,60 (0.58-4.98)

ICU, intensive care unit; ARF, acute respiratory failure; MV, mechanical ventilation

The variables selected to compose the initial logistic regression model were: reason for intubation and days of continuous sedation. The use of the Hosmer-Lemeshow test verified good fit of the final model (p = 0.07). The results allow us to state that individuals with acute respiratory failure have a risk that corresponds to 13% of the risk calculated for individuals who had another reason for intubation, indicating that acute respiratory failure is a “protective factor” for the use of VP (table 3).

Table 3. Results of the logistic regression model fit to the data

Variable	p-value	Odds Ratio (OR)	95% Confidence Interval (CI)
Reason for intubation (acute respiratory failure vs. other causes)	0.009	0.13	0.03 - 0.61
Days of continuous sedation	0.236	0.95	0.87 - 1.03

*Adjusted for age

To study the patient survival time, considering the use or non-use of portable ventilation, the Kaplan-Meier estimator was employed for the survival curves and the log-rank test in the Peto-Prentice version was used for comparisons between groups. The results found are presented below and allow us to state that the survival of those who used PV is greater than those who did not use PV (p=0.010).

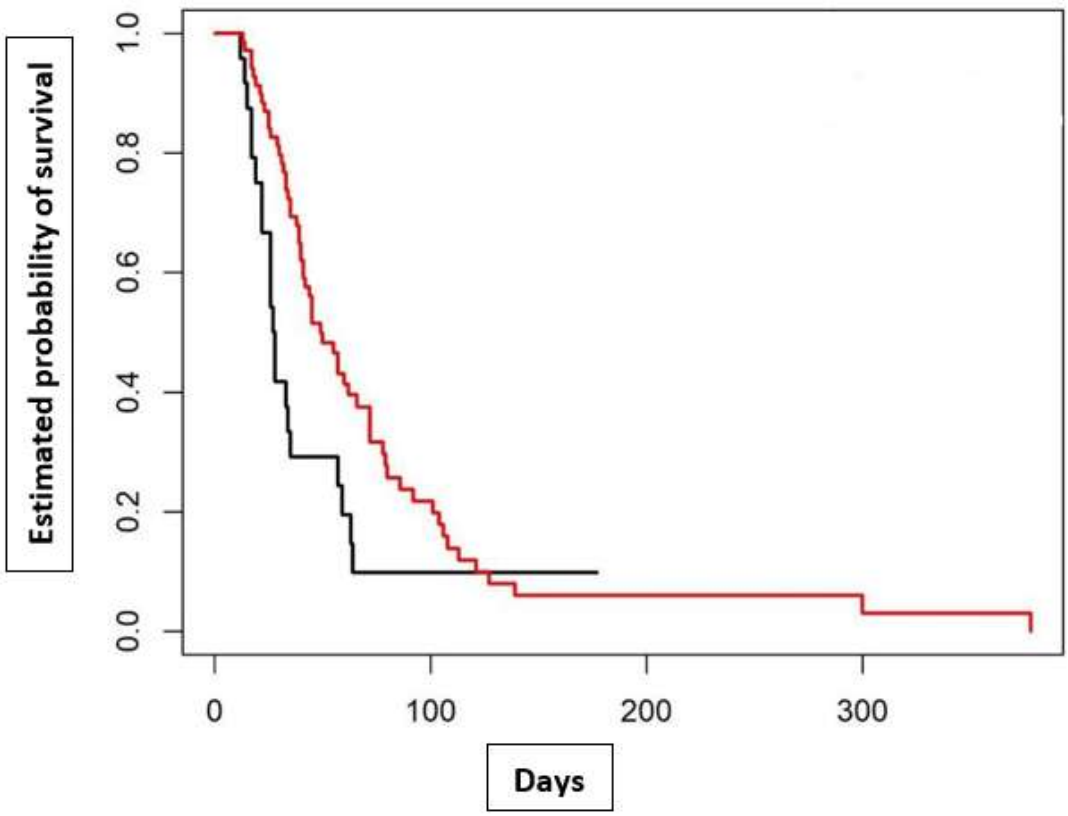

Figure 2. Estimated survival curves, according to the use of portable ventilation (PV). Red line, with portable ventilation; black line, conventional mechanical ventilation (without portable ventilation).
Source: Prepared by the authors (2025).

4. DISCUSSION

Our data showed that tracheostomized patients in the ICU were elderly, with high severity and comorbidities, who remained on mechanical ventilation (MV) for an average of more than two weeks. The most frequently reported reason for performing the tracheostomy was prolonged MV and difficult weaning. This type of patient has some non-modifiable factors such as age and age-related sarcopenia, which can worsen with illness, infections, immobility, use of ventilatory support, sedatives, among other factors. According to the review by Shah *et al*. (2024), a multidisciplinary approach is of paramount importance for patients with prolonged MV and difficult weaning. According to the authors, in addition to physicians and nurses, physiotherapists, speech therapists, pharmacists, nutritionists, psychologists, and occupational therapists are essential for the recovery of these patients. The authors reported that the pathophysiology leading to difficult weaning can be better understood by considering the factors that contribute to adequate alveolar ventilation. In patients with weaning difficulties, the interaction between load (defined mainly by the mechanics of the respiratory system – lung

compliance and airway resistance), stimulus (adequate neural drive), and the capacity of the respiratory muscles (preserved neuromuscular function) should be considered in relation to impairment of the neural airway. Patients with difficult weaning have various dysfunctions caused by sarcopenia, neuromuscular, cognitive, nutritional, and psychological alterations, among others, which justify the need for multi- and interprofessional support for better outcomes. In some hospitals in Brazil, this approach is already implemented, but in others it is still under development. It is necessary to invest in continuing education for teams to care for what is currently termed a chronically critically ill patient.

The use of portable ventilators (PV), generally used for non-invasive ventilatory support, connected directly to the tracheostomy cannula is not widely reported in the literature. However, this practice has been common in the routine of the hospital studied. During the ventilator weaning phase, tracheostomized patients in intensive care units are adapted to PV as a substitute for conventional mechanical ventilation, providing total or partial ventilatory support, depending on the patient's clinical condition. Some were weaned from PV during their ICU stay, and others were transferred to the ward while still using them. This study aimed to analyze tracheostomized patients in the ICU, since some of these patients were indicated for the use of PV and others were not. A question then arose regarding the characteristics and factors considered for the indication of PV. Our study identified that patients intubated for acute respiratory failure were less likely to use PV than patients intubated for COPD and neurological causes. Furthermore, we identified that the patients who used PV were older.

Ibrahim *et al*. (2012) is one of the few studies that reported the use of PV in tracheostomized patients, with difficulty in weaning from ventilatory support. Its sample consisted of 26 elderly patients, with a predominance of females, and varied diagnoses, among which COPD and neuromuscular diseases predominated. Among the patients, 76.9% were discharged from the ICU, and 53.8% were later discharged from the hospital. The authors concluded that the use of PV to tracheostomized patients represents a strong alternative that should be considered when discharging patients who fail to wean. In contrast, in our sample, we observed that most of the patients (88.7%) were discharged from the ICU, but only 14.3% were later discharged from the hospital (more than half of the patients died in the ward). Of the patients who died in the ward, 52.4% were still dependent on PV support.

According to the study of Tekin and Bulut (2024), tracheostomized patients have a similar profile: prolonged hospital stays, high severity, high mortality rates and low percentage of decannulation. Vargas *et al*. (2024) have investigated ICU mortality, clinical outcome and quality of life up to 12 months after ICU discharge in 694 tracheostomized critically ill patients. They concluded that in mechanically ventilated patients, elective tracheostomy is associated with high mortality, including over time after discharge from the ICU, with low quality of life, psychological suffering and difficult rehabilitation.

Survival analysis clearly demonstrated that patients who used PV had greater hospital survival, but the estimated mortality rate was not different between the groups. This data is concerning, as it shows that there was a prolongation of time without improvement in outcomes. According to a recent review (Rose; Messer, 2024), patients with prolonged MV had higher mortality rates at 1 and 5 years, reaching 89% at 5 years. Risk factors associated with mortality in these patients with PMV include older age, higher body mass index, severity of acute critical illness, including thrombocytopenia, acute kidney injury, vasopressor dependence, pre-existing kidney injury, and weaning failure. It is worth mentioning that in Brazil weaning centers or post-acute care hospitals are scarce. Moreover, many hospitals do not have semi-intensive care units for patients dependent on ventilatory support, which leads to longer periods of hospitalization in the wards. Our impression is that the lack of structured units with a multiprofessional team for chronic critical ill patients also impacts on the mortality of these patients in the post-ICU period.

In a narrative review, Guia *et al*. (2021) studied the role of NIV in weaning and decannulating patients with tracheostomy. They considered that there is an increasing number of ICU surviving patients who require long-term care due to prolonged MV. This is associated with increased health costs and organizational challenges for health systems due to the patient's debility state and the poor long-term results. Also, the authors concluded, based on the analyzed results of studies using NIV to facilitate weaning from MV, that the following key points are evident: most studies were retrospective; the predominant location was weaning centers; NIV can be a supplement for patients with difficult weaning, resulting in successful discontinuation in more than 80%; hypercapnia during or after a spontaneous breathing trial can identify patients who can benefit most from NIV; in 60% or more of the cases, NIV will need to be maintained as overnight

support. An interesting point of this review is that the authors were unable to identify exactly how NIV was adapted to tracheostomized patients. Some studies used masks with occlusion of the tracheostomy and only one reported direct connection to the cannula.

In a more recent study, Liu, Li and Shi (2023) published a case study with a systematic review of the literature on the use of non-invasive ventilators adapted directly to the tracheostomy. The authors identified 72 cases that underwent ventilation via a tracheotomy tube. The main diagnoses included neuromuscular disease (NMD), chronic obstructive pulmonary disease, pneumonia, and congenital central hypoventilation syndrome. They concluded that tracheostomy preservation should be considered in some patients with advanced neuromuscular diseases if there is respiratory muscle weakness or risk of aspiration and suggest that attempts can be made to use a non-invasive ventilator due to the advantages of portability, ease of operation and low cost. Furthermore, according to the authors, non-invasive ventilators can be used in patients with tracheostomy, either by direct connection or mask ventilation with the capped cannula, especially for weaning and decannulation of the tracheostomy tube. However, the authors emphasize that individualized assessment is necessary for such an indication.

In a guideline on prolonged noninvasive ventilation, published in 2023 by Hansen-Flaschen e Ackrivo, the authors concluded that there are still major deficiencies in current evidence-based knowledge about the best way to manage chronic respiratory failure. Considering the reality in Brazil, prolonged or chronic invasive or noninvasive mechanical ventilation becomes a much more complex issue, due to economic and social issues. However, there is a growing and significant number of patients on home mechanical ventilation. It is estimated that in Brazil, approximately 300 thousand people are in home care, of which 6% (approximately 18 thousand people) are using mechanical ventilation (Cantarini *et al*., 2022). This data reveals the importance of the topic and the need for improvements in the management of these patients, starting from the intensive care unit.

It is worth noting that tracheostomized patients are very complex and require the care of a multidisciplinary team. A systematic review published by Ninan *et al*. (2023) concluded that tracheostomy patients who received care from an interdisciplinary team showed improvements in several clinical outcomes.

This study has some limitations. First, there was not an established protocol to orient the decision on how and to whom PV, as a ventilatory support or weaning strategy

to tracheostomized patients, should be applied. Second, the PV parameters and respiratory variables in the ICU and ward were not collected hampering the evaluation of the adequation of the PV support provided. Despite the limitations, it is important to consider that this is one of the few studies that address this topic with a larger sample of patients. Our findings are important for widely disseminating the fact that these patients are very seriously ill and require more specialized and multidisciplinary care. Population aging may lead to an increase in this type of patient in the hospital setting, and specialized care should be planned.

5. CONCLUSION

Our study identified that the use of portable ventilation in tracheostomized patients was higher in elderly, neurological, and COPD patients. Although hospital survival was higher in patients with portable ventilation, the mortality rate did not differ, demonstrating the need for more interventions. Literature data indicate that a multidisciplinary approach is essential for this type of patient, considering the various dysfunctions developed during prolonged hospitalization. Continuing education for professionals specialized in the care of chronically critically ill patients may be key to better outcomes. The use of portable ventilation does not appear to be deleterious, but it did not improve outcomes over time. Conducting controlled clinical trials could elucidate whether portable ventilation is indeed effective for maintaining patients dependent on ventilatory support.

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