CLINICAL CASE

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Nursing care process in a patient with chronic mechanical ventilation

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ABSTRACT

Chronic mechanical ventilation is a particular situation in which a patient is assisted through an endotracheal tube or a tracheostomy tube. In this procedure, the critical care nurse provides comprehensive care based on the scientific method, using the nursing process. **Objective:** To establish a standardized and individualized process aimed at improving the patient's physical and psycho-emotional health status and attempting to reintegrate the patient into society under the most favorable conditions. **Materials and methods:** This clinical case describes a 51-year-old male patient who was hospitalized with a diagnosis of endocarditis and then admitted to the operating room for tricuspid plasty plus debridement, and surgical cleaning, with removal of the automatic internal defibrillator electrode. The patient was then admitted to the ICU with mechanical ventilation. **Results:** The patient experienced difficulty weaning from mechanical ventilation, with multiple failures. A care plan was implemented using the NANDA-NOC and NIC taxonomy, achieving successful weaning and subsequent transfer from intermediate care to the general hospitalization service. **Conclusion:** This clinical case highlights the importance of applying a standardized and individualized methodology for complex cases.

Keywords: mechanical ventilation; nursing diagnoses; NANDA International; respiratory failure.

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INTRODUCTION

Respiratory failure refers to the inability of the respiratory system to perform its fundamental function—the transfer of oxygen and CO_2 between circulating blood and ambient air. Its treatment involves a combination of oxygenation and ventilation support (1).

Thus, one of the main admission diagnoses in intensive care units (ICUs) is respiratory failure. Acute respiratory failure occurs in approximately 56% of patients in this specialized area (2). For this reason, the primary objective is to reduce ICU mortality and initiate mechanical ventilation as soon as possible.

Invasive mechanical ventilation (IMV) is considered a support method for patients with deteriorating respiratory function. It involves the management of elements

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such as force (pressure), displacement (volume), and rate of change over time (flow). Additionally, it reduces energy expenditure and minimizes the risk of hyper- or hypoventilation (3).

Long-term or chronic mechanical ventilation refers to respiratory support provided every day for a period of one to three months in intensive care units. However, as patients recover from the acute phase of their illness, they develop a chronic critical condition (4). Since the use of controlled-mode mechanical ventilation inhibits spontaneous diaphragmatic activity for long periods, it leads to atrophy of diaphragmatic muscle fibers and a reduction in muscle strength, making the weaning from mechanical ventilation more challenging (4, 5).

A systematic review including sixty international studies up to the year 2020 reported that the mortality rate of patients on chronic ventilation in ICUs ranged from 13.7 to 77.8% and was associated with age, with a mean of 60 years (6).

Moreover, a study on patients undergoing extremely prolonged mechanical ventilation weaning indicated that in-hospital survival significantly depends on age and the presence of tracheomalacia, both independently and dependent on the duration of prolonged ventilation (7).

A study conducted in Jerusalem in a three-year cohort of patients on prolonged ventilation reported that out of the total of 125 patients, only 16 (12.8%) were successfully weaned. Among those who were not weaned, the mortality rate was 34.8%, concluding that the success of weaning primarily depends on comorbidities (8).

There are no Peruvian statistics on patients requiring prolonged ventilation; however, in the private hospital in Lima where this case was developed, 8% of hospitalized patients required mechanical ventilation (9).

A literature search did not yield any articles proposing nursing care for this type of patient in a clinical case format.

Considering that mechanical ventilation is a procedure capable of treating many patients and saving lives, it is also associated with numerous complications. This reflects the need for nursing care that requires knowledge, expertise, skills, attitude, values and good professional judgment. Such care must be standardized and specific to ensure safe patient care while preventing complications in this type of patients. A clinical case is presented using nursing taxonomy to propose nursing care for a patient with chronic mechanical ventilation.

CASE PRESENTATION

A 51-year-old male patient, originally from Colombia, with risk factors including hypertension, dilated cardiomyopathy, using an implantable cardioverter defibrillator (ICD), obesity, chronic heart failure (CHF), atrial fibrillation with reduced ejection fraction, type II diabetes mellitus, post-surgical colon cancer with chemotherapy, and repair of atrial defect 19 years ago in the USA. A month prior to admission, the patient presented hyperthermia and dyspnea, being hospitalized in another facility where he was diagnosed with *Enterococcus fecalis* infection and vegetations on the ICD lead (implanted in March 2024). He was then transferred to our institution for ICD removal.

He was admitted to the emergency area, where he was evaluated and hospitalized before undergoing surgery. Following ICD removal in the operating room, he was transferred to the intensive care unit in a hemodynamically unstable condition, requiring high-dose vasopressor support and mechanical ventilation with high ventilatory parameters.

During his hospitalization in the intensive care unit, the patient experienced multiple complications, with ventilation-associated pneumonia being the most significant.

Throughout his ICU stay, several attempts were made to wean him from mechanical ventilation, but the process was frustrating due to the patient's anxiety. Therefore, we implemented the following nursing process for chronic ventilation.

Stage of the nursing process: assessment

The patient assessment was conducted according to Jean Watson's model, using the NANDA taxonomy (North American Nursing Diagnosis Association) to develop the care plan based on Margaret Gordon's functional health patterns. The data were collected from the medical history through a personal interview with the patient.

1. Health Perception and Management Pattern: The patient and family have sufficient knowledge about their health condition, but are reluctant to follow the care measures associated with weaning from mechanical ventilation.

2. Nutritional-metabolic pattern: At the beginning of hospitalization in the ICU, the patient receives an enteral nutrition, which was later transitioned to parenteral nutrition following postoperative

management of an intra-abdominal abscess. Later, in intermediate care, an oral diet was introduced while continuing parenteral nutrition. During the current hospitalization, the patient developed hyperglycemia, which was initially controlled with an insulin infusion and then controlled with subcutaneous insulin.

3. Elimination pattern:

- Intestinal: The patient has continuous semi-liquid bowel movements. The patient has a nasogastric tube set to intermittent gravity drainage when experiencing nausea to reduce abdominal distention.
- Urinary: During the current hospitalization, the patient developed renal insufficiency, requiring dialysis and furosemide infusion. Subsequently, the patient responded well to treatment, achieving spontaneous urination and an adequate discharge.
- Skin: The patient has dermatitis associated with fecal incontinence in the perianal area, which resolves with the application of a skin protector.

4. Activity/exercise pattern: The patient does not cooperate with physical or respiratory therapy and is taught to sit on the chair on his own. On very few occasions, mobilization from the bed to the chair is achieved with the support of the family. The patient is hemodynamically stable, has a subcutaneous ICD, and presents with critical illness polyneuropathy, which limits self-care activities, requiring constant assistance from the healthcare personnel. The patient has tracheostomy with chronic mechanical ventilation, with difficult weaning due to intra-abdominal abscesses that led to abdominal distention. The patient's lack of cooperation in weaning also contributed to failure. Currently, mechanical ventilation with high flow oxygen is alternated, but education and support continue to encourage participation in therapy.

5. Sleep and Rest Pattern: The patient presented insomnia and anxiety. He had an interview with the psychiatrist, who prescribed quetiapine and clonazepam. The family member was allowed to stay and go out of the unit to help the patient relax.

6. Cognitive-Perceptual and Self-Perception Pattern: Patient is awake, with a Glasgow scale of: 10+TQT, oriented in time, place, and person, with isocoric and reactive pupils. Communication with the patient is nonverbal, relying on lip reading and gestures. The patient reports discouragement and lack of interest, showing little cooperation due to his illness and the sequelae.

7. Role-relationship pattern: The patient receives visits from his ex-wife, current partner, and children.

Stage of the nursing process: diagnosis

- (00031) Ineffective airway clearance: related to the accumulation of secretions due to the presence of a tracheostomy device, as evidenced by abundant secretions (rhonchi).
- (00034) Dysfunctional ventilatory weaning response: related to decreased motivation, fear, anxiety, and ineffective airway clearance, as evidenced by low tidal volumes, high respiratory rate, and increased heart rate.
- (00108) Bathing/hygiene self-care deficit: related to weakness, fatigue, anxiety and lack of motivation.
- (00118) Disturbed body image: related to the disease process and its sequelae, as evidenced by expressions of low self-esteem, changes in social involvement and little cooperation in therapies.
- (00146) Anxiety: related to situational crisis and changes in the environment, as evidenced by distress and growing concern about the disease.
- (00004) Risk for infection: related to the presence of invasive devices (central venous catheter and tracheostomy).
- (00304) Risk for pressure injuries in adults: related to weakness and lack of motivation.
- (00039) Risk of aspiration: related by the presence of tracheostomy and nasogastric tube.
- (00303) Risk for falls in adult: related to impaired mobility and polyneuropathy.
- (00291) Risk for thrombosis: related to reduced mobility and prolonged bed rest.
- (00214) *Impaired comfort*: related to altered emotional state, distress, concern, and lack of mobility in bed.

The nursing care process is presented in Tables 1 and 2.

Table 1. Stage of the nursing process: planning.

Diagnosis: (00031) ineffective airway clearance								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(0410) Respiratory status: airway patency	(041007) Abnormal breath sounds		X			X	2	5
Diagnosis: (00034) Dysfunctional ventilatory weaning response								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(0412) Mechanical ventilation weaning response: adult	(041211) Oxygen saturation			X	X		3	4
	(041223) Difficulty breathing on one's own			X	X		3	4
Diagnosis: (00108) Bathing or hygiene self-care deficit								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(0313) Self-care level	(030514) Maintains a neat appearance			X		X	3	5
	(030506) Maintains oral hygiene		X			X	2	5
Diagnosis: (00118) Disturbed body image								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1200) Body image	(12009) Adaptation to changes in health status	X			X		1	4

NOC: Nursing outcomes classification.

Table 1. (*Continuation*).

Diagnosis: (00146) Anxiety								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1402) Anxiety self-control	(140215) Reports absence of physical manifestations of anxiety		X		X		2	4
	(140217) Controls anxiety response		X		X		2	4
Diagnosis: (00004) Risk for infection								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1902) Risk control: infectious process	(190201) Recognizes the risk			X		X	3	5
Diagnosis: (00304) Risk for pressure injuries in adults								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial Status**	**Target Status**
(1101) Tissue integrity: skin and mucous membranes	(110115) Skin lesions		X			X	2	5
Diagnosis: (00039) Risk of aspiration:								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1935) Risk control: aspiration	(191801) Identifies risk factors			X		X	3	5
	(191803) Sits upright to eat			X	X		3	4

NOC: Nursing outcomes classification.

Table 1. (*Continuation*).

Diagnosis: (00303) Fall risk in adults								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1909) Risk control: falls	(190919) Use of safe means of transportation			X		X	3	5
Diagnosis: (00291) Risk for thrombosis								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(1932) Risk control: thrombosis	(190201) Recognizes risk factors			X		X	3	5
	(191401) Recognizes the risk of cardiovascular disease			X		X	3	5
Diagnosis: (00214) Impaired comfort								
NOC	**Indicators**	**Likert Scale**					**DIANA**	
		1	**2**	**3**	**4**	**5**	**Initial status**	**Target status**
(2002) Comfort and well-being level	(200213) Ability to control activities			X		X	3	5
	(200210) Satisfaction for self-improvement ability			X		X	3	5

NOC: Nursing outcomes classification.

Table 2. Stage of the nursing process: implementation and evaluation.

Diagnosis: (00031) Ineffective airway clearance	
NIC	**Activities**
(3160) Airway suctioning	1. Correct patient identification 2. Hand hygiene 3. Use of PPE. 4. Auscultate respiratory sounds before and after suctioning. 5. Observe mechanical ventilator waveform graphics. 6. Closed circuit suctioning. 7. Hyperoxygenate at 100% before suctioning. 8. Set suction pressure between 80 and 120 mmHg. 9. Perform respiratory therapy. 10. Teach the patient deep breathing exercises before suctioning. 11. Irrigate with saline solution after suctioning. 12. Educate the patient and family about suctioning.
(3230) Chest physiotherapy	8. Monitor respiratory and cardiac status. 9. Monitor the quantity and characteristics of secretions. 10. Tilt the bed at an angle of 10° every 30 minutes for 2 hours during the day. 11. Aspirate released secretions according to protocol. 12. Encourage the patient to cough during or after the procedure. 13. Perform nebulizations according to medical instruction. 14. Apply rapid manual and vigorous vibration to the chest.
Diagnosis: (00034) Dysfunctional ventilatory weaning response	
NIC	**Activities**
(3390) Ventilation assistance	1. Maintain a patent airway. 2. Monitor synchronization between the patient and the ventilator. 3. Monitor patient tolerance in CPAP mode. 4. Monitor arterial blood gases, arterial oxygen saturation, tidal volume, minute volume, heart rate, respiratory rate, and blood pressure. 5. Observe if there is respiratory muscle fatigue. 6. Administer medications (bronchodilators and inhalers) to promote airway patency and gas exchange.

NIC: Nursing Interventions Classification.

Table 2. (*Continuation*).

NIC	Activities
(3310) Weaning from mechanical ventilation	1. Suction the airway. 2. Administer respiratory therapy. 3. To determine the patient's readiness for weaning (hemodynamic, neurological, and metabolic stability, optimal current condition for weaning). 4. Initiate weaning with 30-minute trial periods. 5. Set the ventilator to spontaneous mode. 6. Gradually reduce pressure support. 7. Assess the patient's level of consciousness. 8. Avoid pharmacological sedation during weaning tests. 9. Provide patient monitoring measures during weaning. 10. Explain to the patient and family what may occur during the weaning period. 11. Keep the patient in *semi-Fowler*'s position.
(3350) Respiratory Monitoring	1. Monitor respiratory frequency, rhythm, depth and effort. 2. Monitor breathing patterns: bradipnea, tachypnea, hyperventilation, Kussmaul breathing, Cheyne-Stokes respiration, apneustic breathing and ataxic patterns. 3. Follow-up on radiology reports.
Diagnosis: (00108) Bathing or hygiene self-care deficit	
NIC	**Activities**
(1801) Self-Care assistance: bathing/hygiene (1610) Bathing (1680) Nail care (1640) Ear care (1650) Eye care	1. Take daily bed baths. 2. Eye hygiene, after application of natural tear drops every 4 hours. 3. Ear hygiene. 4. Hair hygiene every other day. 5. Genital hygiene. 6. Shaving the patient. 7. Providing a calm and relaxing atmosphere. 8. Establishing a routine of self-care activities.
Diagnosis: (00118) Disturbed body image	
NIC	**Activities**
(7170) Facilitate family presence	1. Assure the family that the patient is receiving the best possible care. 2. Identify the healthcare staff attending to the patient at each shift change. 3. Explain the rules for visiting hours of family members in the patient's room.

NIC: Nursing Interventions Classification.

Table 2. (*Continuation*).

NIC	Activities
(5220) Body image enhancement	1. Help the patient discuss stressors affecting body image due to illness or surgery. 2. Help the patient identify actions that improve their appearance.
Diagnosis: (00146) Anxiety	
NIC	**Activities**
(7140) Family support	1. Foster an open and trusting relationship with the family.
(5270) Emotional support (5820) Anxiety reduction	1. Include family members and patients in decision-making regarding their care. 2. Help the patient recognize their feelings, such as anxiety, anger, and sadness. 3. Listen to patient's expressions of feelings and beliefs. 4. Provide support through physical contact, such as a hug or touch. 5. Coordinate a visit to the psychiatrist. 6. Stay with the patient and provide a sense of security during periods of increased anxiety. 7. Encourage the patient to take an active role in their treatment and rehabilitation. 8. Create an environment that fosters trust. 9. Observe for verbal and non-verbal signs of anxiety.
Diagnosis: (00004) Risk for infection	
NIC	**Activities**
(6540) Infection control (0480) Ostomy care	1. Clean the patient's unit environment every 4 hours. 2. Change patient care equipment according to the institution's protocol. 3. Care of central venous catheter. 4. Maintain appropriate isolation techniques. 5. Limit the number of visitors. 6. Educate the family on hygiene during the five moments. 7. Administer antibiotic treatment as needed and as indicated by the physician. 8. Promote adequate nutritional intake. 9. Encourage deep breathing and coughing to prevent pneumonia. 10. Implement universal precautions. 11. Change peripheral and/or central line sites in accordance with current CDC guidelines. 12. Tracheostomy ostomy care. 13. Manage chest drains according to protocol. 14. Obtain cultures if necessary. 15. Bath with chlorhexidine once a week (on Mondays). 16. Monitor inflammatory markers (complete blood count, CRP).

NIC: Nursing Interventions Classification.

Table 2. (*Continuation*).

NIC	Activities
(7690) Laboratory data interpretation	1. Monitor laboratory results for trends and significant changes.
Diagnosis: (00304) Risk for pressure injuries in adults	
NIC	**Activities**
(0840) Position change	1. Provide a pneumatic mattress. 2. Explain to the patient that his/her position will be changed. 3. Encourage the patient to participate in position changes. 4. Ensure the full team (6 people) is available for postural changes. 5. Use assistive devices for patient mobilization (hoist and transfer equipment). 6. Change of position every 3 hours. 7. Minimize friction and shear forces when repositioning the patient.
(3584) Skin care: topical treatment	1. Apply lubricant to the back, neck, and bony prominence with gentle massage at each change of position. 2. Inspect the skin every day. 3. Keep bed linens clean, dry and wrinkle-free. 4. Place heel protectors. 5. Register any skin changes in the institutional format. 6. Use the Braden scale every 12-hour shift and whenever there are changes in the patient's condition.
Diagnosis: (00039) Risk of aspiration:	
NIC	**Activities**
(3200) Aspiration precautions	1. Monitor the level of consciousness, cough reflex, gag reflex and swallowing ability. 2. Keep the head of the bed elevated above 30°. 3. Maintain the tracheostomy cuff inflated. 4. Supervise oral feeding. 5. Check gastric residual volume. 6. Use prokinetic agents as appropriate. 7. Provide oral care.
(1874) Gastrointestinal tube care	1. Verify the placement and patency of the gastrointestinal tube through auscultation. 2. Fix the gastrointestinal tube to the appropriate body area as needed. 3. Observe for sensations of fullness, nausea, and vomiting. 4. Periodically auscultate bowel sounds. 5. Remove the gastrointestinal tube when indicated.

NIC: Nursing Interventions Classification.

Table 2. (*Continuation*).

Diagnosis: (00303) Fall risk in adults	
NIC	**Activities**
(6610) Risk identification	1. Assess the risk of falls using the Hendrich II Scale. 2. Review medical history and prior documentation to determine current nursing care needs.
(6574) Patient identification	1. Put on white bracelet on the non-dominant hand, including the patient's full name and identification document. 2. Put on a yellow bracelet on all patients at risk of falls upon admission to the institution. 3. Verify the identification bracelet before each procedure or care intervention.
(7980) Incident reporting	1. Identify events (patient falls) that compromise patient safety and require reporting. 2. Report patient-related incidents through the institutional platform.
(6486) Environmental management: safety (6490) Fall prevention	1. Keep the bed rails raised. 2. Keep the bed at the lowest possible level. 3. Remove environmental hazards. 4. Leave the call bell within the patient's reach. 5. Identify the patient's safety needs based on physical condition, cognitive function, and behavioral history. 6. Ensure objects are within the patient's reach without requiring effort. 7. Respond to the call light immediately. 8. Identify behaviors and factors that increase the risk of falls.
Diagnosis: (00291) Risk for thrombosis	
NIC	**Activities**
(4066) Circulatory care: venous insufficiency	1. Perform a thorough assessment of the peripheral circulation (peripheral pulses, edema, capillary refill, color, and temperature). 2. Apply anti-embolism stockings with intermittent pneumatic compression. 3. Administer antiplatelet or anticoagulant therapy as prescribed by the physician. 4. Reposition the patient at least every 2 hours. 5. Encourage the patient to perform active or passive range- of-motion exercises, especially in the lower extremities.
(0140) Promote body mechanics	1. Apply body mechanics principles along with safe patient handling techniques. 2. Collaborate with physical therapy to develop a plan for body mechanics. 3. Help the patient identify appropriate postural exercises.

NIC: Nursing Interventions Classification.

Table 2. (*Continuation*).

Diagnosis: (00214) *Impaired comfort*	
NIC	**Activities**
(7960) Health care information exchange	1. Using the SBAR format, the nursing report is made at the change of shift, informing the patient's condition, as well as the recommendations.
(6482) Environmental management: comfort	1. Generate a calm and supportive environment. 2. Ensure a clean and safe environment. 3. Set the room temperature for the patient's comfort. 4. Set lighting to suit the patient's activities. 5. Adjust monitor and ventilator alarms according to desired objectives. 6. Facilitate hygiene measures to maintain patient comfort. 7. Position the patient to enhance comfort, using body alignment principles, pillow support, and joint support during movement). 8. Avoid exposing skin or mucous membranes to irritants (feces, urine, and bronchial secretions).

NIC: Nursing Interventions Classification.

DISCUSSION

The overall mortality rate in ICU patients undergoing mechanical ventilation weaning was 27%, with a higher rate in the prolonged weaning group (42%) compared to the difficult weaning group (29%) and simple weaning group (15%) (10).

The Weaning Continuum Model (WCM) of the American Association of Critical Care Nurses (AACCN) conceptualizes weaning as a continuous and dynamic process influenced by physiological variables (myocardial function and oxygenation, ventilatory muscles, nutritional status), as well as psychological and environmental factors. The combination of these factors leads to three possible outcomes: complete weaning, partial incomplete weaning, and total incomplete weaning (11).

Many authors state that patients undergoing mechanical ventilation during the weaning process experience fear, uncertainty, anxiety and frustration, which hinders the process.

On the other hand, the emotional impact of weaning on patients is highly significant in achieving a successful outcome.

According to Wang's study, patients who had undergone mechanical ventilation experienced both physical suffering (pain and *discomfort*) and psychological suffering (helplessness, passivity, hallucinations, nightmares and altered levels of consciousness) (12).

The nursing care process, as a scientific method, allows for the provision of individualized and standardized care, as well as humanized care. To achieve this, objectives and expected outcomes were planned using the NANDA taxonomy for nursing assessment and diagnosis, NIC for interventions and activities, and NOC for expected outcomes with indicators. The Likert scale and DIANA score were applied to evaluate the results obtained.

Follow-up helps establish and maintain a strong connection between the patient and the nursing staff, who provide care 24 hours a day, contributing to the optimization of care and the satisfaction of the patient's expectations and needs. In this regard, the nurse-patient relationship is essential during care, applying the scientific method to ensure high-quality and humanized care both for the patient and family, ultimately leading to a successful mechanical ventilator weaning process.

This case highlights nursing care for chronic mechanical ventilation. This systematization serves as reference for other cases in the future.

CONCLUSIONS

Nursing care provided with a holistic approach—emphasizing physical, psychological and technological attention—has demonstrated significant improvement in our patient's mechanical ventilator weaning process. The nurse plays a fundamental role in ventilator *weaning*, as her continuous presence alongside the patient fosters nurse-patient interaction, enhances trust and security, and ultimately helps achieve the desired outcome, a successful ventilator *weaning process.*

Beyond the clinical case presented, we suggest the need to design weaning protocols that emphasize the importance of nursing interventions aimed at the patient and the family, aiming to reduce patient anxiety during the ventilator weaning process.

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KFAY: conceptualization, formal analysis, data curation, research, writing - review & editing.

SPEM, YMFC, CHMM: research, methodology, validation, visualization, writing of original draft.

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