

# Statistical analysis of the BWAP method for weaning intubated patients in the intensive care unit: innovative approaches in modern medicine

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## KEYWORDS:

BWAP, Intensive care unit, Mechanical ventilation, Critical care patients, Innovative approaches.

## ABSTRACT

This study conducts a comprehensive analysis of the Burn Weaning Assessment Program (BWAP), a 26-factor assessment tool designed to evaluate the weaning process for intubated patients in intensive care units. The primary objective of this research is to mitigate variability in the clinical management of critically ill patients.

The impetus for this investigation arises from the pursuit of innovative and statistically robust methodologies in contemporary medicine, coupled with direct experiences in emergency care settings. Through a thorough review of existing literature and the execution of daily assessments at Monsignor Dimiccoli Hospital in Barletta, this study evaluates a cohort of patients undergoing mechanical ventilation. This process allows for the exploration of new care management strategies and the assessment of weaning potential.

Findings underscore the significance of utilizing systematic assessment tools to determine patient readiness for weaning from mechanically assisted ventilation (MAV). The BWAP is distinguished by its comprehensive consideration of a diverse array of factors, encompassing not only respiratory parameters but also cardiovascular, metabolic, and psychological aspects. This holistic approach contributes to a reduction in the duration of MAV and overall hospitalization time.

Furthermore, the study highlights the pivotal role of nursing professionals but also all medical staff could be instructed for those correct proceedings and to take care about ill patients in facilitating successful MAV discontinuation through targeted clinical, rehabilitative, and educational interventions.

## INTRODUCTION

This study is based on an in-depth analysis of the Burn Weaning Assessment Program (BWAP), a comprehensive 26-factor assessment tool designed for evaluating the weaning process of intubated patients. The primary objective of the BWAP is to reduce variability in clinical practices related to the management of patients within complex intensive care units. My motivation to explore this methodology originates from a genuine interest in more innovative and statistically sound approaches in modern medicine, further inspired by my academic journey culminating in an undergraduate internship in emergency care. This experience prompted me to investigate new strategies for patient management and to engage in further research.

Following a thorough documentation of relevant studies, I conducted daily analyses, taking responsibility for each patient's care while evaluating the outcomes of patients undergoing mechanical ventilation

for three or more days. All patients were managed according to a multidisciplinary approach, adhering to the burn assessment plan checklist, weaning study protocol, and sedation guidelines.

The purpose of this thesis is to perform a rigorous statistical analysis of the collected data, emphasizing the validity of the employed methods. In doing so, this study aims to propose novel approaches to care planning and management, as well as to assess the potential for effective weaning. A field survey was conducted at Monsignor Dimiccoli Hospital in Barletta, involving a sample of male and female patients aged 30 to 80 years from a major urban center in southern Italy. The survey encompassed questions regarding patient identity and demographic information, followed by inquiries into hemodynamic status, nutritional and fluid balance, subjective assessments of sleep/wakefulness, pain, anxiety, radiographic findings, blood pressure, and respiratory levels.



### Citation:

E. Pescechera et al.  
"Statistical analysis of the bwap method for weaning intubated patients in the intensive care unit: innovative approaches in modern medicine"

JAHC Essay 2024

Received: 2024-05-14

Revised: 2024-10-03

Accepted: 2024-10-04

Published: 2024-10-12



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MATERIALS AND METHODS

Stato emodinamico		Valutazione generale
---	---	1. Stato emodinamico stabile (frequenza del polso, gittata cardiaca)?
---	---	2. Privo di fattori che aumentano o diminuiscono il tasso metabolico (convulsioni, febbre, sepsi, batteriemia, ipotiroidismo/ipertiroidismo)?
---	---	3. Ematocrito >25% (o basale)?
---	---	4. Sistematicamente idratato (peso pari o vicino al basale, apporto e diuresi bilanciati)?
---	---	5. Nutrito (albumina sierica >2.5 mg/dL, alimentazione parenterale/enterale massimizzata)? (Se l'albumina è bassa e anasarca o terza spaziatura è presente, il punteggio per l'idratazione dovrebbe essere no)
---	---	6. Elettroliti nei limiti normali? (compresi calcio, magnesio, fosforo) Calcio corretto per il livello di albumina 7.
---	---	Dolore controllato? (determinazione soggettiva)
---	---	8. Sonno/riposo adeguati? (determinazione soggettiva)
---	---	9. Livello appropriato di ansia e nervosismo? (determinazione soggettiva)
---	---	10. Assenza di disturbi intestinali (diarrea, stitichezza, ileo)?
---	---	11. Miglioramento della forza/resistenza generale del corpo (per es., alzarsi dal letto sulla sedia, programma di attività progressivo)?
---	---	12. I risultati della radiografia del torace migliorano?
SI No Non valutato		Valutazione respiratoria
<i>Flusso gassoso e lavoro respiratorio 13.</i>		
---	---	Frequenza e pattern respiratorio eupneico (respiri spontanei <25/min, senza dispnea, nessun uso di muscoli accessori) Questo item viene valutato con il paziente senza supporto ventilatorio mentre vengono misurati i parametri negli item 20-23.
---	---	14. Assenza di suoni respiratori avventizi (ronchi, rantoli, sibili)?
---	---	15. Secrezioni sottili e minime?
---	---	16. Assenza di malattie/deformità neuromuscolare?
---	---	17. Assenza di distensione addominale/obesità/ascite?
---	---	18. Tubo endotracheale orale 7.5mm o trachea 6.5 mm
<i>Pulizia delle vie aeree</i>		
---	---	19. I riflessi della tosse e della deglutizione sono adeguati?
<i>Forza</i>		
---	---	20. Pressione inspiratoria negativa 20 cm H2O

The scientific experiment uses a qualitatively structured questionnaire consisting of 26 closed-ended items. Specifically, the 26 closed-ended items were structured as follows; a general assessment presenting:

- 1 item on the patient's hemodynamic status;
- 1 item on factors that increase or decrease metabolic rate (seizures, fever, sepsis, bacteremia, hypothyroidism, hyperthyroidism);
- 1 item on hematocrit values;
- 3 items on hydration, nutrition and electrolyte values;
- 3 items on subjective determinations of pain, sleep/rest, anxiety/nervousness;
- 1 item on the presence of bowel disorders;
- 1 item on the improvement of general body strength/endurance;

-1 item on chest X-ray findings.

A respiratory assessment presenting:

- 6 items assessing gas flow and respiratory work;
- 1 item on cough and swallowing reflexes;
- 2 items on strength;
- 2 items on endurance;
- 3 items on blood gas analysis.

The scientific evaluation form provides three alternatives (0: not evaluated, 1: no, 2: yes).

Specifically, patients admitted to the Operating Unit of Anesthesia and Resuscitation of the Dimiccoli Hospital in Barletta were subjected to this statistical survey in the time frame from March 5, 2023, to June 13, 2023, through a virtual form that was possible to create thanks to the use of Google forms: <https://forms.gle/5wRx8yiPTGwXJ3817>.



Sezione 1 di 2

## Checklist BWAP: programma di svezzamento del paziente intubato

Foglio di lavoro per la valutazione dello svezzamento a 26 fattori di un paziente con ventilazione meccanica. Valutazione utilizzata per ridurre la re-intubazione, migliorare i risultati clinici con riduzione di infezioni sanguigne. Pratica nella gestione clinica dei pazienti sottoposti a ventilazione meccanica.

RESULTS AND DISCUSSIONS

	Media	Moda	Mediana
1. Lo stato emodinamico del pz è stabile? (frequenza del polso, gittata cardiaca)	1,74	2	2
2. Il pz è privo di fattori che aumentano o diminuiscono il tasso metabolico (convulsioni, febbre, sepsi, b	1,91	2	2
3. L' Ematocrito è >25% ?	1,92	2	2
4. Il pz è sistematicamente idratato? (peso pari o vicino al basale, apporto e diuresi bilanciati)	2,00	2	2
5. Il pz risulta nutrito? (albumina sierica >2,5 mg/dL, alimentazione parenterale/enterale massimizzata)	1,99	2	2
6. Gli elettroliti sono nei limiti normali? (compresi calcio, magnesio) *Calcio corretto per il livello di albu	1,86	2	2
7. Il dolore è controllato? (determinazione soggettiva)	0,97	0	1
8. I valori sonno/riposo sono adeguati? (determinazione soggettiva)	1,85	2	2
9. Il livello di ansia e nervosismo è appropriato? (determinazione soggettiva)	0,99	0	1
10. I disturbi intestinali sono assenti (diarrea, stitichezza, ileo)?	1,98	2	2
11. La forza/resistenza generale del corpo è in miglioramento? (per es., alzarsi dal letto sulla sedia, prc	0,88	0	1
12. I risultati della radiografia del torace sono in miglioramento?	0,62	0	1
13. Frequenza e pattern respiratorio euipoico. I respiri spontanei sono <25/min, senza dispnea e nes:	0,85	0	1
14. I suoni respiratori aventizi sono assenti (ronchi, rantoli, sibili)?	1,96	2	2
15. Il pz presenta secrezioni sottili e minime?	1,93	2	2
16. La malattia/deformità neuromuscolare è assente?	1,99	2	2
17. La distensione addominale/obesità/ascite è assente?	1,95	2	2
18. E' presente il tubo endotracheale orale (7,0mm) o tracheale (6,5 mm)?	1,75	2	2
19. I riflessi della tosse e della deglutizione sono adeguati?	1,46	2	2
20. La pressione inspiratoria negativa è ≤ 20 cm H2O?	2,00	2	2
21. La pressione espiratoria positiva è ≤ 30 cm H2O?	2,00	2	2
22. Il volume corrente spontaneo è >5 mL/kg?	1,45	1	1
23. La capacità vitale è >10-15 mL/kg?	1,45	1	1
24. Valore PH 7,30-7,45	1,93	2	2
25. Valore PaCO2 circa 40 mmHg (o basale) con ventilazione al minuto <10 L/min (valutata mentre il pz	1,79	2	2
26. Valore PaO2 >60 mm Hg con frazione di ossigeno inspirato <40%	1,82	2	2

From the graphically represented results, it is evident that the central component of the trend index is characterized by the mode, which exhibits a correlational value of  $p = 0.003$  across all surveyed items. Additionally, the data indicate that the male sample possesses greater numerical significance compared to the female sample; however, this distinction is not reflected in the scientific evaluation of the administered assessment tool.

For items 7, 9, 10, and 13 (Table 1), no statistical analysis of positive or negative outcomes was feasible. This limitation arises from the challenges associated with obtaining subjective assessments from patients in specific clinical states, influenced by factors such as cognitive impairments, medication effects, hospitalization stress, and emotional disturbances.

It is imperative for healthcare professionals to consider these factors when evaluating a patient's condition and to employ validated tools for assessing pain and anxiety. This ensures the delivery of appropriate and targeted interventions, particularly when patient responses may be compromised.

The findings underscore the critical importance of utilizing assessment tools to determine a patient's readiness for gradual disconnection from mechani-

cally assisted ventilation (MAV). Previous research has demonstrated the effectiveness of various respiratory indicators, ranging from simple to complex, in predicting successful weaning outcomes. However, reliance solely on respiratory indicators may not always provide an accurate prediction of weaning success. Therefore, it is essential to consider additional factors unrelated to respiratory function, including cardiovascular, metabolic, and psychological status.

Among the most discussed tools is the Burn Weaning Assessment Program (BWAP), which comprehensively incorporates these diverse factors. The BWAP has been shown to reduce both the duration of mechanical ventilation and the overall length of hospitalization, thereby contributing to cost savings within the healthcare sector. Consequently, minimizing the duration of ventilatory support is crucial for improving the outcomes of the weaning process. Furthermore, the role of nursing and medical staff is pivotal in this context. Given their close proximity to patients throughout the weaning process, they can significantly influence the success of transitioning from MAV through the implementation of clinical, rehabilitative, and educational interventions, as well as providing essential emotional support.



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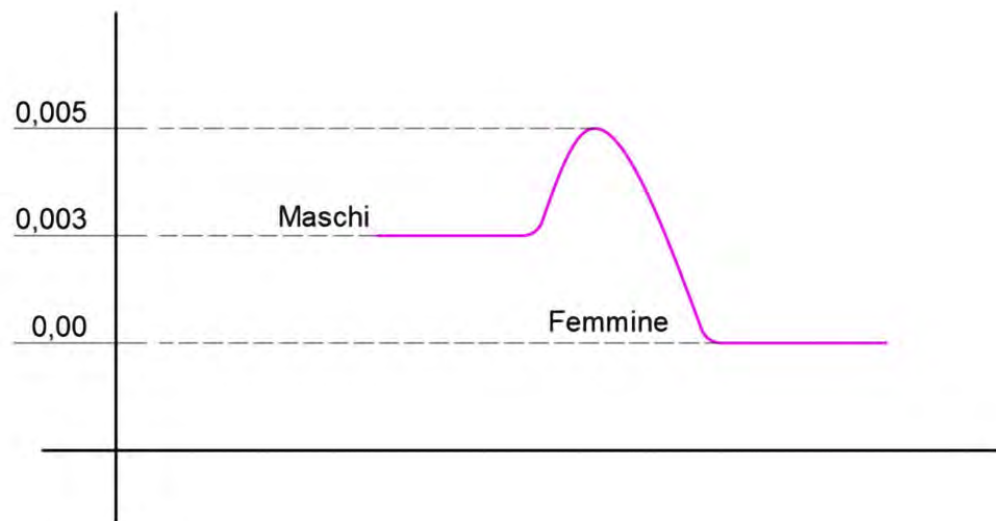
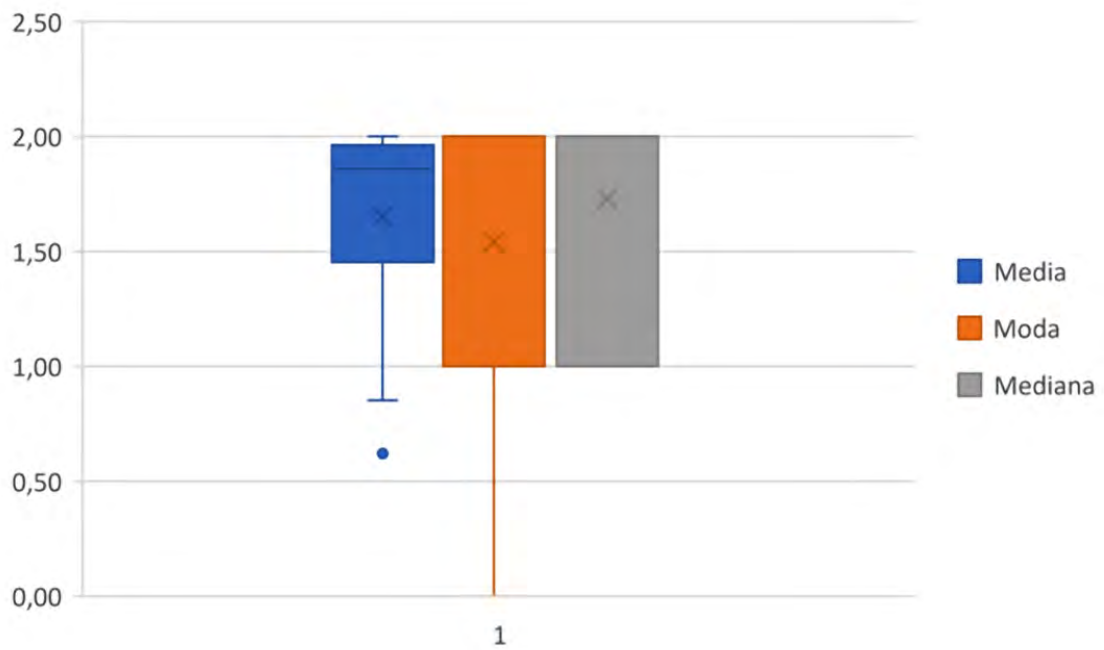
JAHC Essay 2024

Received: 2024-05-14  
Revised: 2024-10-03  
Accepted: 2024-10-04  
Published: 2024-10-12



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## REFERENCES

1. Burns SM, Fisher C, Earven Tribble SS, et al. Multifactor clinical score and outcome of mechanical ventilation weaning trials: Burns Wean Assessment Program. *Am J Crit Care*. 2010;19(5):431-439. doi:10.4037/ajcc2010273
2. *La Respirazione Artificiale Base e Pratica*. Accessed September 5, 2023. file:///C:/Users/elena/Downloads/La%20respirazione%20artificiale%20-%20Larsen%20(1).pdf
3. *Le caratteristiche della ventilazione meccanica*. <https://www.nurse24.it/studenti/risorse-studenti/le-caratteristiche-della-ventilazione-meccanica.html>. Accessed September 5, 2023.
4. *Panoramica sulla ventilazione meccanica*. <https://www.msmanuals.com/it-it/professionale/medicina-di-terapia-intensiva/insufficienza-respiratoria-e-ventilazione-meccanica/panoramica-sulla-ventilazione-meccanica#:~:text=Ventilazione%20a%20pressione%20ciclata%201%20Ventilazione%20con%20controllo,tramite%20una%20maschera%20facciale%20aderente%20%28diversi%20tipi%20disponibili%29.> Accessed September 21, 2023.
5. *Casco per ventilazione non invasiva*. <https://www.nurse24.it/infermiere/presidio/casco-per-ventilazione-non-invasiva.html>. Accessed September 5, 2023.