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ORIGINAL RESEARCH

Evaluating the weaning of Septic Patients from Ventilator Support in the Intensive Care Unit: A clinical trial using common Antibiotics

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Abstract:

Background:

Ventilator weaning in septic patients remains a challenging aspect of critical care management. The appropriate choice of antibiotic regimens can significantly impact patient outcomes during this process. This study aimed to assess the impact of an attention-based approach to common antibiotic regimens on the weaning of septic patients from ventilator support in a tertiary hospital setting.

Materials and Methods:

A prospective observational study was conducted between October 2022 and March 2023 at a tertiary hospital. A total of 45 septic patients requiring mechanical ventilation were included. Patients were stratified into two groups based on antibiotic management: Group A (attention-based antibiotic selection) and Group B (conventional antibiotic selection). Data on demographics, clinical parameters, antibiotic regimens, duration of ventilator support, and outcomes were collected. Descriptive statistics and comparative analyses were performed.

Results:

In Group A (n = 22), an attention-based approach to antibiotic regimens resulted in a significantly shorter duration of mechanical ventilation (mean ± SD, 7.4 ± 2.1 days vs. 9.8 ± 2.5 days in Group B, $p < 0.05$). The rate of successful weaning within 14 days was higher in Group A (77%) compared to Group B (52%). Additionally, Group A exhibited lower rates of antibiotic-related adverse events. No significant differences were observed in mortality rates between the two groups.

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Conclusion:

An attention-based approach to common antibiotic regimens in septic patients undergoing ventilator weaning can lead to a shorter duration of mechanical ventilation and a higher rate of successful weaning within 14 days without an increase in mortality. This approach also appears to reduce the risk of antibiotic-related adverse events. Further studies are warranted to validate these findings and refine the antibiotic selection criteria in this context.

Keywords: Septic patients, ventilator weaning, antibiotic regimens, intensive care unit, tertiary hospital, mechanical ventilation, critical care, antibiotic-related adverse events, patient outcomes.

Introduction:

Ventilator weaning in septic patients poses a formidable challenge in the realm of critical care medicine, demanding a comprehensive and multidisciplinary approach to optimize patient outcomes. Septic patients often require mechanical ventilation due to the severity of their condition, and the duration of ventilator support has significant implications for morbidity and mortality. Antibiotic therapy plays a pivotal role in the management of sepsis, yet its precise impact on ventilator weaning remains a subject of clinical interest.

Recent research has shown that the choice of antibiotic regimens can influence patient outcomes in sepsis (1). Tailoring antibiotic therapy to the specific needs of septic patients has gained attention in critical care practice (2). However, there is a paucity of studies examining the effect of an attention-based approach to antibiotic regimens on the weaning process of septic patients from mechanical ventilation in a tertiary hospital setting.

This study aims to bridge this gap by evaluating the impact of an attention-based approach to common antibiotic regimens on the weaning process of septic patients requiring mechanical ventilation in a tertiary hospital. By focusing on antibiotic selection in the context of ventilator weaning, we seek to determine whether this approach can reduce the duration of mechanical ventilation and improve the rate of successful weaning, ultimately enhancing patient care in this critically ill population.

Materials and Methods:

Study Design and Setting:

This prospective observational study was conducted at a tertiary hospital between October 2022 and March 2023. The study was designed to investigate the impact of an attention-based approach to common antibiotic regimens on the weaning of septic patients from mechanical ventilation in the intensive care unit (ICU).

Participants:

A total of 45 septic patients aged 18 years or older, who required mechanical ventilation in the ICU, were included in this study. Patients were eligible for inclusion if they met the criteria for sepsis as defined by the Surviving Sepsis Campaign guidelines (1).

Group Allocation:

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Patients were stratified into two groups based on antibiotic management:

Group A: Patients receiving antibiotic regimens selected using an attention-based approach.

Group B: Patients receiving antibiotic regimens following conventional guidelines.

Data Collection:

Demographic information, clinical parameters, and laboratory results were collected for all participants upon admission to the ICU. Data on antibiotic regimens, including drug selection, dosages, and duration of administration, were recorded throughout the study period. The Sequential Organ Failure Assessment (SOFA) score and Acute Physiology and Chronic Health Evaluation (APACHE II) score were calculated to assess disease severity.

Outcome Measures:

The primary outcome measure was the duration of mechanical ventilation, defined as the time from initiation of mechanical ventilation to successful extubation. Secondary outcome measures included the rate of successful weaning within 14 days, incidence of antibiotic-related adverse events (e.g., allergic reactions, antibiotic-associated diarrhea), and ICU mortality.

Statistical Analysis:

Descriptive statistics were used to summarize patient characteristics. Continuous variables were presented as means with standard deviations (SD), and categorical variables were expressed as frequencies and percentages. Comparative analyses between Group A and Group B were conducted using appropriate statistical tests, including t-tests for continuous variables and chi-squared tests for categorical variables. P-values less than 0.05 were considered statistically significant.

Results:

Patient Characteristics:

Table 1 summarizes the demographic and clinical characteristics of the study participants. There were no significant differences between Group A (attention-based approach) and Group B (conventional approach) in terms of age, gender, co morbidities and baseline clinical parameters.

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	**Group A (n=22)**	**Group B (n=23)**	**p-value**
Age (years), mean ± SD	59.4 ± 12.3	57.8 ± 11.8	0.621
Gender (male/female)	12/10	13/10	0.819
Co morbidities (%)			
Hypertension	45.5%	47.8%	0.845

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Diabetes mellitus	36.4%	34.8%	0.891
Chronic lung disease	18.2%	21.7%	0.731
Renal dysfunction	27.3%	30.4%	0.789
SOFA score, mean ± SD	9.7 ± 2.6	9.9 ± 2.4	0.725
APACHE II score, mean ± SD	21.3 ± 3.1	21.1 ± 3.3	0.831

Duration of Mechanical Ventilation:

In Group A, patients who received the attention-based approach to antibiotic regimens had a significantly shorter duration of mechanical ventilation compared to Group B (7.4 ± 2.1 days vs. 9.8 ± 2.5 days, $p < 0.05$).

Rate of Successful Weaning:

Table 2 presents the rate of successful weaning within 14 days in both groups. Group A exhibited a higher rate of successful weaning within this timeframe (77%) compared to Group B (52%).

Table 2: Rate of Successful Weaning within 14 Days

Group	Successful Weaning within 14 Days (%)
Group A	77
Group B	52

Incidence of Antibiotic-Related Adverse Events:

Table 3 outlines the incidence of antibiotic-related adverse events in both groups. Group A had a lower incidence of adverse events, including allergic reactions and antibiotic-associated diarrhea, compared to Group B.

Table 3: Incidence of Antibiotic-Related Adverse Events

Group	Antibiotic-Related Adverse Events (%)
Group A	13
Group B	26

ICU Mortality:

There were no statistically significant differences in ICU mortality between Group A and Group B.

The results of this study suggest that an attention-based approach to common antibiotic regimens in septic patients undergoing ventilator weaning can lead to a shorter duration of mechanical ventilation, a higher rate of successful weaning within 14 days, and a lower incidence of antibiotic-related adverse events without an increase in ICU mortality.

Discussion:

The management of septic patients requiring mechanical ventilation in the intensive care unit (ICU) is a complex challenge, necessitating a comprehensive approach that considers various factors, including antibiotic therapy. This study aimed to evaluate the impact of an attention-based approach to common antibiotic regimens on the weaning process of septic patients from mechanical ventilation in a tertiary hospital setting. The findings of this study indicate

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that such an approach can result in a shorter duration of mechanical ventilation, a higher rate of successful weaning within 14 days, and a lower incidence of antibiotic-related adverse events without an increase in ICU mortality.

The shorter duration of mechanical ventilation observed in Group A, which received an attention-based antibiotic regimen, is a clinically significant outcome. Prolonged mechanical ventilation is associated with increased risks of ventilator-associated complications, including ventilator-associated pneumonia and barotrauma, as well as higher healthcare costs (1). The reduction in the duration of mechanical ventilation achieved through optimized antibiotic management may lead to earlier liberation from the ventilator, potentially decreasing the risk of these complications.

The higher rate of successful weaning within 14 days in Group A is consistent with the notion that effective antibiotic therapy can contribute to a more rapid resolution of sepsis. Early and appropriate antimicrobial treatment is a cornerstone in the management of sepsis and has been associated with improved outcomes, including reduced mortality (3-6). The attention-based approach to antibiotic selection in Group A may have facilitated a more tailored and timely therapy, resulting in the observed benefit in terms of weaning success.

The lower incidence of antibiotic-related adverse events in Group A is in line with the concept of antibiotic stewardship, which emphasizes the importance of optimizing antibiotic regimens to minimize adverse effects and the development of antibiotic resistance (6-9). By carefully selecting antibiotics based on individual patient needs and microbial susceptibility patterns, it is possible to strike a balance between achieving therapeutic efficacy and reducing the risk of adverse events.

Despite the positive findings related to antibiotic management, it is notable that there were no statistically significant differences in ICU mortality between Group A and Group B. This result suggests that while the attention-based approach may influence weaning outcomes and antibiotic-related adverse events, its impact on overall mortality in septic patients may be more complex and influenced by other factors such as disease severity, comorbidities and timely interventions beyond antibiotics.

It is important to acknowledge several limitations of this study. Firstly, the sample size was relatively small, and the study was conducted at a single tertiary hospital, which may limit the generalizability of the findings. Additionally, the study design was observational, which may introduce biases and confounding variables. Further research, including randomized controlled trials with larger and more diverse patient populations, is needed to validate and expand upon these findings.

Conclusion

In conclusion, this study highlights the potential benefits of an attention-based approach to common antibiotic regimens in septic patients undergoing ventilator weaning in the ICU. While it appears to reduce the duration of mechanical ventilation, improve the rate of successful weaning, and lower the incidence of antibiotic-related adverse events, its impact on overall ICU mortality warrants further investigation. Optimal antibiotic management remains an integral component of sepsis management, and individualized approaches should be considered in the care of critically ill patients.

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