



CLINICO-BACTERIOLOGICAL PROFILE AND ANTIBIOGRAM OF ENDOTRACHEAL SECRETIONS AMONG ICU PATIENTS-A SINGLE CENTER EXPERIENCE

Respiratory Medicine

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ABSTRACT

Introduction: Prolonged mechanical ventilation (PMV) is a significant challenge in intensive care units and is associated with increased morbidity and mortality. Various underlying co-morbidities contribute to PMV, with reported occurrence ranging from 6-52%. Ventilator associated pneumonia (VAP) is one of the most common Intensive care unit (ICU)-acquired infections and contributes substantially to hospital-acquired infections.

Aims and Objectives:

- To study the Etiology and risk factors for prolonged ventilation.
- To isolate the potential pathogens in Endotracheal (ET) secretions.
- To study the antimicrobial susceptibility patterns to various antibiotics

Methods: Possible reasons for prolonged ventilation were isolated and Endotracheal secretions were collected from patients on mechanical ventilator for more than 48 hours. Bacterial growth was cultured and the Antibiotic susceptibility profile was determined for these isolates and studied. The collected data was entered in Excel, and analyzed. **Results:** Majority of patients were males and belonged to the 41–60 years age group. Among the isolates, the most common were *Acinetobacter baumannii* (28%) and *Klebsiella pneumoniae* (18%). These were followed by *Pseudomonas aeruginosa* (16%), *Escherichia coli* (10%), *Staphylococcus aureus* (MRSA) (6%) and others (22%). Identified possible risk factors in our cases are Hypertension (70%), Diabetes mellitus (52%), Smoking (26%), End stage kidney disease (22%), COPD (12%), Coronary artery disease (10%), Malignancy (6%). **Conclusion:** The patient population at risk will benefit by the application of the results of this study. The antibiotic resistance pattern of these isolates will aid clinicians in selecting the appropriate antimicrobial agents. Hence, regular surveillance of local bacteriological profiles and antibiograms, along with strict infection control and antibiotic stewardship practices, are essential for appropriate empirical therapy and for reducing ICU morbidity and mortality.

KEYWORDS

Prolonged Mechanical Ventilation, Ventilator Associated Pneumonia, Endotracheal Secretions, Antimicrobial Susceptibility.

1. INTRODUCTION

Mechanical ventilation is an essential life-saving intervention for critically ill patients admitted to intensive care units. However, prolonged mechanical ventilation is associated with several complications including ventilator associated pneumonia (VAP), increased duration of hospital stay and higher mortality rates. Ventilator associated pneumonia is among the most common hospital-acquired infections in ICU settings. The presence of an endotracheal tube bypasses the natural defense mechanisms of the respiratory tract, allowing microorganisms to colonize the lower airways. Knowledge of the local bacteriological profile and antibiogram helps clinicians initiate appropriate empirical antibiotic therapy and improves patient outcomes.

2. Aim and Objectives

Aim: To study the Clinico-bacteriological profile and antibiogram of endotracheal secretions among ICU patients receiving prolonged mechanical ventilation.

Objectives:

- To evaluate risk factors for prolonged mechanical ventilation
- To isolate the potential pathogens from endotracheal secretions
- To study the antimicrobial susceptibility patterns of the isolated organisms

3. MATERIALS AND METHODS

This prospective observational study was conducted in Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation.

Study Period: January 2024 and June 2024.

Sample Size: Fifty patients

Inclusion Criteria:

- Patients of age >18 years

- Patients who were mechanically ventilated or tracheostomised in ICU due to various etiologies for more than 7 days

Exclusion Criteria:

- Patients with pre-existing lung infection prior to intubation
- Patients whose attendants denied consent

Methodology:

Endotracheal secretions were collected aseptically using sterile suction techniques and transported immediately to the microbiology laboratory for culture and sensitivity testing. Bacterial isolates were identified using standard microbiological methods. Antibiotic susceptibility testing was done using standard disc diffusion techniques. Clinical data including patient comorbidities, duration of mechanical ventilation and ICU stay were recorded and analyzed.

3. RESULTS

Table 1: Distribution of Gender Among Study Population

Gender	Percentage
Male	66%
Female	34%

Table 2: Distribution of Age Among Study Population

Age	Percentage
< 18 years	0
19 - 40 years	23%
41 - 60 years	43%
> 60 years	34%

Table 3: Distribution of Risk Factors Among Study Population

Comorbidity	Percentage
Hypertension	70%
Diabetes mellitus	52%
Smoking	26%

End stage kidney disease	22%
COPD	12%
Coronary artery disease	10%
Maligancy	6%

Table 4: Bacterial Isolates from ET Secretions

Organism	Percentage
Acinetobacter baumannii	28%
Klebsiella pneumoniae	18%
Pseudomonas aeruginosa	16%
Escherichia coli	10%
Staphylococcus aureus (MRSA)	6%
Others	22%

Table 5: Antibiotic Susceptibility Pattern of Isolated Organisms

Antibiotic	Acinetobacter baumannii	Klebsiella pneumoniae	Pseudomonas aeruginosa	Escherichia coli	MRSA
Ampicillin	Resistant	Resistant	Resistant	Resistant	Resistant
Ceftriaxone	Resistant	Resistant	Resistant	Sensitive	-
Piperacillin-tazobactam	Resistant	Sensitive	Sensitive	Sensitive	-
Meropenem	Resistant	Sensitive	Sensitive	Sensitive	-
Amikacin	Resistant	Sensitive	Sensitive	Sensitive	-
Ciprofloxacin	Resistant	Resistant	Sensitive	Sensitive	-
Tigecycline	Sensitive	Sensitive	-	Sensitive	-
Polymyxin B	Sensitive	Sensitive	Sensitive	Sensitive	-
Vancomycin	-	-	-	-	Sensitive
Linezolid	-	-	-	-	Sensitive

5. DISCUSSION

Mechanical ventilation is an indispensable intervention in critical care but is associated with an increased risk of respiratory infections. Ventilator associated pneumonia significantly contributes to ICU morbidity and mortality and remains one of the most common nosocomial infections among mechanically ventilated patients^[1,2].

In present study, Male predominance and higher occurrence in middle-aged and elderly patients were noted similar to earlier studies^[8,9].

In present study, Hypertension and diabetes mellitus were the most common risk factors, followed by smoking and end-stage kidney disease. Similar findings have been reported in previous study^[10].

In the present study, Gram-negative bacteria were the predominant organisms isolated from endotracheal secretions. Acinetobacter baumannii was the most frequently isolated organism followed by Klebsiella pneumoniae and Pseudomonas aeruginosa. Similar findings have been reported in other studies evaluating ventilator associated infections in ICU settings^[3,4].

In the present study, the antibiogram findings revealed high resistance patterns among Gram-negative organisms. Acinetobacter baumannii showed resistance to most first-line antibiotics and was mainly sensitive to polymyxin B and tigecycline. Gram-positive isolates including MRSA demonstrated high sensitivity to vancomycin and linezolid, which is consistent with observations reported in earlier studies^[5,6].

The emergence of multidrug-resistant organisms represents a major challenge in ICU settings. Continuous monitoring of antimicrobial susceptibility patterns and strict infection control practices are essential for preventing the spread of resistant pathogens^[2,7].

6. CONCLUSION

The present study provides insight into the gender predilection along with age distribution, risk factors, etiological agents and antimicrobial susceptibility patterns of bacteria isolated from endotracheal secretions in mechanically ventilated ICU patients. Gram-negative organisms, particularly Acinetobacter baumannii and Klebsiella pneumoniae, were the predominant pathogens identified^[3,4].

Regular surveillance of antimicrobial resistance patterns and implementation of hospital-specific antibiograms are essential for guiding empirical antibiotic therapy and improving patient outcomes^[7].

7. REFERENCES

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