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## A study of ventilator: Associated pneumonia cases in pediatric intensive care unit

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### Abstract

**Background:** Ventilator-associated pneumonia refers to bacterial pneumonia developed in patients who have been mechanically ventilated for duration of more than 48 hours. The present study was conducted to evaluate cases of ventilator-associated pneumonia in pediatrics department.

**Materials & Methods:** The present study was conducted on 26 children age ranged 1- 16 years of both genders. In all patients, the duration of mechanical ventilation, length of intensive care and the duration of hospital stay were recorded.

**Results:** Out of 26, males were 12 and females were 14. Days on ventilator were <15 days in 9 and >15 days in 17, position was supine in 6 and semi- recumbent in 20, patients were conscious and drowsy in 5 and stuporous and comatose in 21. 23 survived and 3 expired. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Ventilator-associated pneumonia is major cause of mortality and morbidity in pediatrics. 3 patients died while 23 survived from ventilator-associated pneumonia.

**Keywords:** conscious, pneumonia, ventilator

### Introduction

Ventilator-associated pneumonia (VAP) refers to bacterial pneumonia developed in patients who have been mechanically ventilated for duration of more than 48 h [1]. It ranges from 6 to 52% and can reach 76% in some specific settings. Hospital-acquired pneumonia (HAP) is the pneumonia after 48 h or more after admission, which did not appear to be incubating at the time of admission [2].

Despite major advances in the techniques for the management of ventilator dependent patients, VAP continues to complicate the course of 8-28% of the patients receiving mechanical ventilation (MV) [3]. Rates of pneumonia are considerably higher among patients hospitalized in intensive care units (ICUs) compared with those in the hospital wards. The risk of pneumonia is increased 3 to 10 folds for the intubated patient receiving mechanical ventilation. The mortality with VAP is considerably high, varying from 24 to 50% and can reach as high as 76% in some specific settings or when lung infection is caused by high risk pathogens [4].

There is no consensus on the preventive strategies akin to adults, in form of bundle approach in children. In 2004, the National Nosocomial Infections Surveillance (NNIS) system of the Centers for Disease Control and Prevention (CDC) reported a mean VAP rate of 2.9 per 1000 ventilator days for participating PICUs in the United States, while pediatric studies across the globe report an incidence of 2–17% [5]. The present study was conducted to evaluate cases of ventilator-associated pneumonia in pediatrics department.

### Materials & Methods

The present study was conducted in the pediatrics department. It comprised of 26 children age ranged 1- 16 years of both genders. The study was approved from ethical committee.

VAP was considered in those mechanically ventilated for >48 hours with clinical pulmonary infection score (CPIS) of 6 or more. A cut off of 96 hours of mechanical ventilation is used to distinguish early onset of VAP from late onset VAP. In all patients, the duration of mechanical ventilation, length of intensive care and the duration of hospital stay were recorded. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

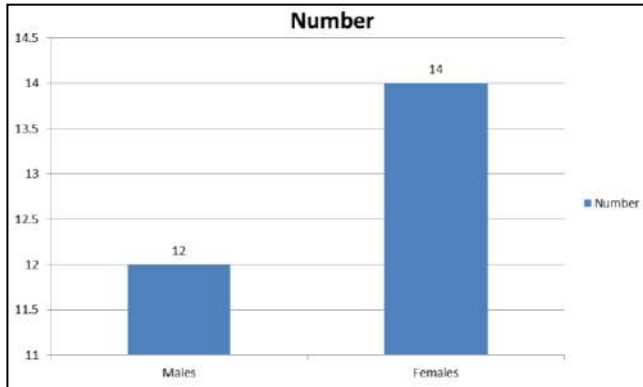
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**Results**

**Table 1:** Distribution of patients

Total- 26		
Gender	Males	Females
Number	12	14

Table I shows that out of 26, males were 12 and females were 14.



**Graph I:** Distribution of patients

**Table 2:** Assessment of parameters

Parameters	Number	P value
<b>Days on ventilator</b>		
<15	9	0.05
>15	17	
<b>Position</b>		
Supine	6	0.04
Semi- recumbent	20	
<b>Consciousness</b>		
Conscious and drowsy	5	0.02
Stuporous and comatose	21	
<b>Outcome</b>		
Survived	23	0.01
Expired	3	

Table II shows that days on ventilator were <15 days in 9 and >15 days in 17, position was supine in 6 and semi-recumbent in 20, patients were conscious and drowsy in 5 and stuporous and comatose in 21. 23 survived and 3 expired. The difference was significant (P< 0.05).

**Discussion**

Ventilator associated pneumonia (VAP) remains to be the commonest cause of hospital morbidity and mortality in spite of advances in diagnostic techniques and management. VAP refers to bacterial pneumonia developing in patients who have been receiving mechanical ventilation for at least 48 hours. It is the commonest complication associated with mechanical ventilation [6].

Lack of a gold standard for diagnosis is the major culprit of poor outcome of VAP. The clinical diagnosis based on purulent sputum may follow intubation or oropharyngeal secretion leakage around airway, chest X-ray changes suspected of VAP may also be a feature of pulmonary oedema, pulmonary infarction, atelectasis or acute respiratory distress syndrome [7]. Fever and leukocytosis are non-specific and can be caused by any condition that releases cytokines. Although microbiology helps in diagnosis, it is not devoid of pitfalls. In fact, it was proven

that colonization of airway is common and presence of pathogens in tracheal secretions in the absence of clinical findings does not suggest VAP [8]. The present study was conducted to evaluate cases of ventilator-associated pneumonia in pediatrics department.

In present study, there were 26 patients which comprised of 12 males and 14 females. It was found that days on ventilator were <15 days in 9 and >15 days in 17, position was supine in 6 and semi- recumbent in 20, patients were conscious and drowsy in 5 and stuporous and comatose in 21. 23 survived and 3 expired.

Kollef [9] found that a total of 128 patients were screened and 86 were enrolled (median age 30 mo 95% CI 4.0–84.0; 72% boys). The most common admitting diagnosis was sepsis (16%) followed by acyanotic congenital heart disease with pneumonia (14%) and the most common indication for ventilation was respiratory failure (45.3%). The incidence of VAP according to CDC criteria was 38.4%, while the incidence of microbiologically confirmed VAP was 24.4%. The incidence of ventilator associated tracheobronchitis (VAT) was found to be 11.6%. Acinetobacter was the most frequently isolated organism (47%) followed by Pseudomonas (28%), Klebsiella (15%), E. coli (5%) and Enterobacter (5%). Risk factors for VAP on bivariate analysis were use of proton pump inhibitor (PPI), enteral feeding and re-intubation. On multivariate analysis, use of PPI and enteral feeding were identified as independent risk factors for VAP.

Gadani *et al.* [10] found that the incidence of early-onset VAP (within 96 h) was found to be 27% while the late-onset type (>96 h) was 73%. Late-onset VAP had poor prognosis in terms of mortality (66%) as compared to the early-onset type (20%). The mortality of patients of the non-VAP group was found to be 41% while that of VAP patients was 54%. Targeted strategies aimed at preventing VAP should be implemented to improve patient outcome and reduce length of intensive care unit stay and costs. Everyone of the critical care unit should understand the factors that place the patients at risk of VAP and utmost importance must be given to prevent VAP.

**Conclusion**

Ventilator-associated pneumonia is major cause of mortality and morbidity in pediatrics. 3 patients died while 23 survived from ventilator-associated pneumonia.

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