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# Ventilator associated pneumonia, incidence and risk factors in emergency intensive care unit Zagazig university hospitals

Howaydah A. Othman [a], Neven M. Gamil [a], Alaa Eldeen M. Elgazzar [b,*], Tarek A. Fouad [a]

[a] Department of Anesthesia, Faculty of Medicine Zagazig University, Egypt
[b] Department of Chest Diseases and Tuberculosis, Faculty of Medicine Zagazig University, Egypt

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ABSTRACT

*Background:* VAP is a common complication in patients receiving mechanical ventilation, and considered to be one of the most common causes of morbidity and mortality, VAP continues to be a major challenge to the critical care physicians and a common nosocomial infection occurring in mechanically ventilated patients, knowledge of important risk factors predisposing to VAP may be useful in implementing simple and effective preventive measures.

*Objective:* To determine the incidence, risk factors of ventilator-associated pneumonia and to get appropriate preventive strategies or institutional policies to decrease rate of infection.

*Patients and method:* One hundred mechanically ventilated patients admitted in the emergency and trauma ICU in Zagazig university hospitals were included in a prospective study to identify the incidence and risk factors of VAP. The clinical suspicion of VAP was done by simplified version of Clinical Pulmonary Infection Score (CPIS) >6. Identification of VAP pathogens was done through specimen collection by bronchoalveolar lavage using fiberoptic bronchoscope thorough the trachea via ETT or tracheostomy tube, the sample was sent for quantitative culture.

*Results:* The incidence of VAP was 22%, impaired consciousness, reintubation and tracheostomy are the significant risk factors of late onset VAP, regarding to the causative pathogens of VAP, klebseilla pneumoniae, acinitobacter and pseudomonas are the most commonly detected pathogens.

*Conclusion:* Incidence of VAP was 22%. Tracheostomy, reintubation and impaired consciousness are highly significant risk factor for the development of VAP mostly late onset VAP.



## Introduction

Ventilator-associated pneumonia (VAP) is defined as pneumonia occurring more than 48 h after the initiation of endotracheal intubation and mechanical ventilation (MV) [1]. The incidence of VAP varies among different studies, depending on the definition, the type of hospital or ICU, the population studied, and the level of antibiotic exposure [2,3]. The lack of consensus regarding the most appropriate method to diagnose VAP also partly explains why incidence rates vary widely from one study to another. The incidence of VAP ranges from 13 to 51 per 1000 ventilator days [4]. VAP is usually classified as either early onset, occurring within the first four days of MV or late onset, developing five or more days after initiation of MV [2].

Intubation and mechanical ventilation are associated with 6-to 21-fold increased risk of acquiring pneumonia in hospital settings [5]. In spite of the advances in the diagnosis, treatment, and prevention of VAP, it continues to be a major cause of morbidity and mortality among critically ill patients [6,7]. Several risk factors may predispose patients to either colonization of the respiratory tract with pathogenic microorganisms and/or aspiration of contaminated secretions [7–9]. Knowledge of the incidence of VAP and their associated risk factors are imperative for development and use of more effective preventive measures.

## Patients and methods

The study was carried out at emergency ICU in Zagazig university hospital, faculty of medicine, Zagazig University in the period

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* Corresponding author.
*E-mail address:* alaametwaly72@yahoo.com (A.E.M. Elgazzar).

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from, April 2013 to April 2014. After approval of local ethical committee, Inclusion criteria was all adult patients admitted to the ICU and indicated for MV for non medical etiology, while exclusion criteria was patients with pneumonia prior to MV or within 48 h after MV and patients who died within 48 h of MV.

The following data were collected on ICU admission (full detailed clinical examination, hospital number, initial diagnosis, date of admission in hospital and ICU, date of institution of mechanical ventilation, date of development of VAP, the presence or absence of the potential risk factors for the development of VAP. In addition to routine investigations including; LFT, KFT, ABGs, ESR, CRP and other clinical data for fulfillment of applied scores e.g. simplified clinical pulmonary infection score (CPIS) Luna et al., 2003 [10].

The study patients were monitored daily after institution of MV for the development of VAP using clinical, radiological and microbiological criteria. The relevant data was recorded from medical records, bedside flow sheets, radiographic reports, and reports of microbiological studies.

## Methods

On admission all patients were subjected to the following:

1. Full detailed medical history.
2. Full clinical examination.
3. Laboratory investigations: complete blood count, kidney function tests, liver function tests, serum electrolytes, ABG.

### *Study plan*

The study plan was done according to Saroj et al., 2013 [11] as in Fig. 1, the patients were classified into the following groups: early VAP group, late VAP group and no VAP group.

### *Diagnostic criteria of studied cases*

Clinical suspicion of VAP was established using Clinical pulmonary infection score (CPIS) as displayed in Table 1.

Score >6 was considered positive and the confirmation was defined by the quantitative culture of BAL with $\geq 10^4$ CFU/mL means positive VAP according to Niederman and Craven, 2005 [2].

### *Identification of VAP pathogens*

#### *Procedure of BAL, specimen collection*

Under complete aseptic conditions, with monitoring of pulse, blood pressure, and oxygen saturation throughout the whole procedure with adequate short acting sedation by IV midazolam, the initial dose is 2.5 mg given 5–10 min before the procedure, then 1 mg may be given if necessary with ventilator settings adjusted to 100% oxygen with proper rate and tidal volume. Fiberoptic bronchoscope) was passed into the trachea through endotracheal tube or tracheostomy tube, draining the segment likely to be involved radiologically, and the sample was collected after instilling 3–5 aliquots of 50 mL sterile saline (0.9% NaCl solution) through the

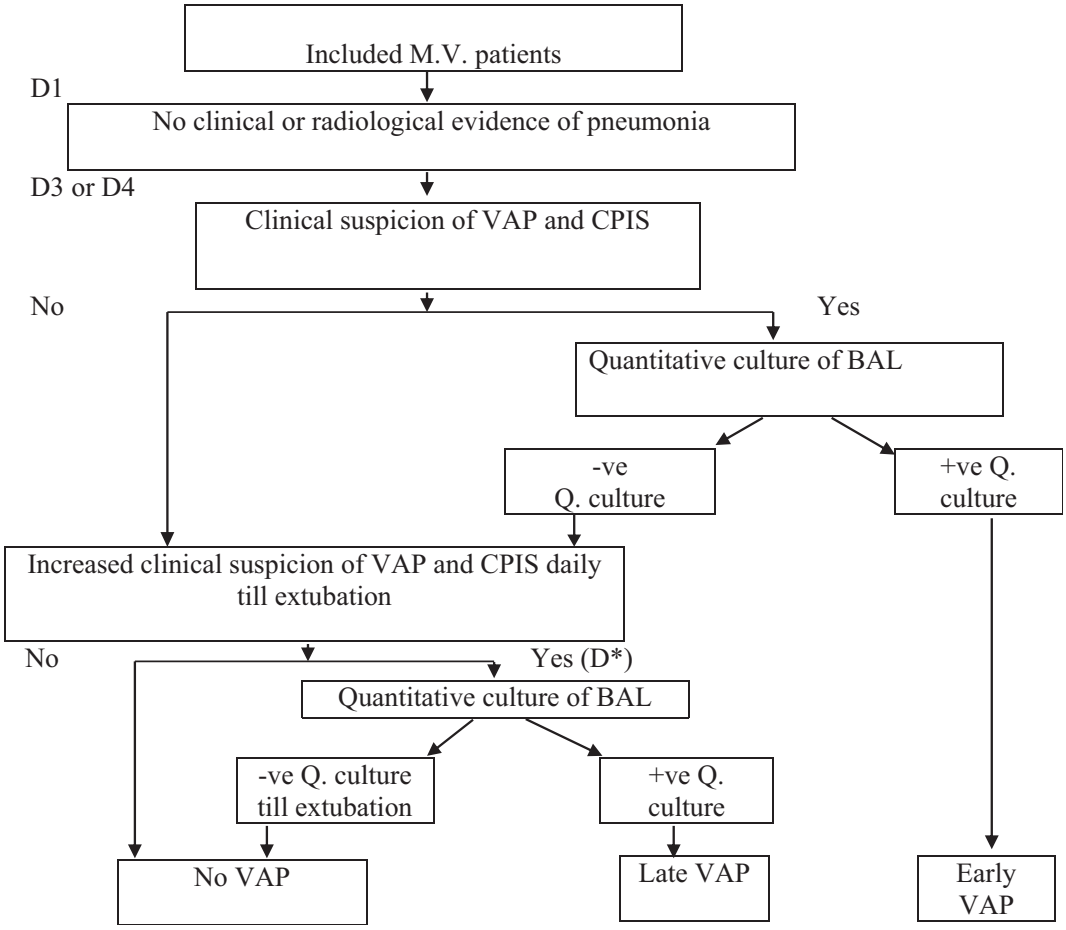


**Fig. 1.** The plan of studied cases: D1: first day of mechanical ventilation; D3: third day of mechanical ventilation, D4: fourth day of mechanical ventilation, D*: day of clinical suspicion of VAP >4 days, Q. culture: quantitative culture, BAL: Bronchoalveolar lavage, VAP: ventilator associated pneumonia, Saroj, 2013 [11].

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