

# Ventilator-Associated Pneumonia: Changing microbiology and implications

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Ventilator-associated pneumonia (VAP) is the most important nosocomial infection among mechanically ventilated patients and the biggest worry of critical care physicians. Though the incidence of VAP has declined in the developed countries, it continues to be unacceptably high in the developing world.<sup>[1]</sup> Its incidence in these countries is 20 times that in the developed nations with significant morbidity, mortality, and enhanced cost of care. In a study by Joseph *et al.* in 2009, the incidence of VAP was found to be 30.67 and 15.87 per 1000 ventilator days in two different ICUs.<sup>[2]</sup> These differences in incidence depend upon the antibiotic profile, ICU environment, and the study population. High incidence of VAP points towards insufficient preventive strategies and probably inappropriate antibiotics administration. Organisms for VAP are different in different part of world and also in different ICUs in the same hospital. The most common organisms for early VAP are community pathogens such as *Streptococcus pneumoniae*, *Hemophilus influenzae*, and Methicillin-sensitive *Staphylococcus aureus*. However, in developing countries, the spectrum is changing and drug-resistant organisms and hospital-acquired pathogens are becoming more common. This may be due to excessive use of broad spectrum antibiotics early in intensive care. Also, more often, gram-negative organisms are the causative pathogens, which are usually multi-drug-resistant.<sup>[3,4]</sup> Since microbiology and resistance pattern in India is different from other countries, there is need for data from our country to choose appropriate antimicrobials for management. Moreover, several risk factors predispose these patients to either colonization of respiratory tract or aspiration of secretions. Knowledge of these risk factors for VAP can be utilized to plan efficient preventive measures.

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**Access this article online**

**Website:** [www.ijccm.org](http://www.ijccm.org)

**DOI:** 10.4103/0972-5229.123432

**Quick Response Code:**



In this issue, Saravu and colleagues<sup>[5]</sup> have studied determinants of VAP and its impact on prognosis. They also analyzed the microbiological data and its implications on mortality in 52 patients with VAP and controls and found that prior use of steroids, reintubation, and bacteremia were significantly associated with the occurrence of VAP. The importance of these determinants lies in the fact that these are potentially modifiable factors. Late-onset VAP was almost as common as early-onset VAP, which is an interesting observation. Most common organisms isolated were *Acinetobacter Pseudomonas*, *Klebsiella*, and *Staphylococcus Aureus*. *Acinetobacter* is the emerging drug-resistant pathogen both in cases with early as well as late VAP. Majority of the pathogens were multi-drug-resistant, and a significant number of organisms were resistant even to infrequently used antibiotics like Colistin and Polymixin, which is a worrying situation both in terms of cost of care and mortality. The frequent community-acquired pathogens causing early VAP elsewhere in world is not grown in the cultures at all.

This study is important because it brings out some clinically significant issues. *Acinetobacter* is now a common organism in ICUs across the subcontinent. This probably denotes poor infection control practices in our setting, leading to selective propagation of drug-

resistant organisms. This study could be helpful in making rational empiric antibiotic choices for patients with VAP. This also brings out the fact that in similar bacteriological environment there might be no wisdom in treating early VAP with  $\beta$ -lactum antibiotics such as ceftriaxone, cefotaxime, or amoxicillin/clavulanic acid as suggested by ATS/ IDSA guidelines.<sup>[6]</sup>

Finally, it boils down to the fact that the appropriate infection control practices and prevention of ICU-acquired infections remains a cornerstone in the management of critically-ill patients. VAP increases the cost of care and utilization of the resources. At this juncture, we would also like to emphasize upon the rational use of initial antibiotics, which not only covers the likely pathogens but also prevents selective propagation-resistant pathogens. This is one important way to prevent the emergence of drug-resistant organisms.

This study has limitation of being retrospective (case-control design) and having a small sample size. The baseline data of the study subjects is not described in details. Also, there is no information on antibiotic use before the development of VAP. However, the authors have commented that most of the patients were on antibiotics in both the groups, which is quite imprecise for any meaningful conclusions to be drawn. It is also not clear as to what were the reasons for giving antibiotics in these cases. Nevertheless, this study is important as there are only a limited number of publications on this subject from India. The study points towards a precarious situation in which our armamentarium of antibiotics is being rapidly depleting as most organisms are developed resistance to even the new generation antibiotics. This is an eye-opener for all healthcare providers working in the field of intensive care. This will help them understand the microbiological spectrum of VAP and plan the

management as well as preventive strategies accordingly. Attention should be paid to modifiable risk factors such as reintubation and corticosteroid administration. Surveillance of ICU infections, to identify and quantify new drug-resistant organisms, preparation of data for infection control, and periodically updating and employing an effective antibiotic policy are the needs of the hour. The focus should be on obtaining early cultures from appropriate specimens so that antibiotics given are more evidence-based and can be scaled down as soon as possible. Finally, there is a need for Indian guidelines and antibiotic policy for nosocomial infections, based on empirical evidence drawn from this country.

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**How to cite this article:** Khilnani GC, Jain N. Ventilator-Associated pneumonia: Changing microbiology and implications. *Indian J Crit Care Med* 2013;17:331-2.

**Source of Support:** Nil, **Conflict of Interest:** None declared.