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Nosocomial and Ventilator-Associated Pneumonia

Edited by A. Torres,
S. Ewig.



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Nosocomial and Ventilator-Associated Pneumonia

Edited by
A. Torres and S. Ewig

Editor in Chief
T. Welte

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This book is one in a series of *European Respiratory Monographs*. Each individual issue provides a comprehensive overview of one specific clinical area of respiratory health, communicating information about the most advanced techniques and systems needed to investigate it. It provides factual and useful scientific detail, drawing on specific case studies and looking into the diagnosis and management of individual patients. Previously published titles in this series are listed at the back of this Monograph.



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Guest Editors



A. Torres

A. Torres is Professor of Pulmonology at the University of Barcelona, Barcelona, Spain. He gained his degree in medicine from the University of Barcelona with several distinctions, after which he took up a residency in pneumology at the Hospital Clínic of Barcelona (Barcelona) before attaining a PhD. He subsequently obtained a position at the Massachusetts General Hospital (Boston, MA, USA) where he received the Edward Shanoff Award for his work. A. Torres has gained several additional qualifications and awards, namely a Masters degree in Hospital Management, a European Diploma in Intensive Care, the Josep Trueta Award of the Academy of Medical Sciences of Catalonia and the Balearic Islands, and the 2007 Lilly Foundation's award in Biomedical and clinical research. His positions of responsibility have included Director of the Clinic Institute of Pneumology and Thoracic Surgery (Hospital Clínic of Barcelona), Professor of Medicine at the University of Barcelona and Coordinator of all intensive care units for the Clinic Institute of Thorax (Hospital Clínic of Barcelona). He has been the Coordinator or Chairman of several international investigation groups, including the Institute of Biomedical Investigations August Pi i Sunyer (IDIBAPS), the Spanish Society of Pneumology and Thoracic Surgery (SEPAR) and the Quality Research Group, to name but a few, as well as participating in some 27 research projects supported by public funds (ISCIII, CICYT, IDIBAPS, CIRIT, European Community, Generalitat de Catalunya) and being a national and international physician of reference. He has also been Vice-President of SEPAR and President of the area of respiratory infections of the Latin American Thorax Association (ALAT). A. Torres is currently on the Editorial Board for a number of medical journals including the *European Respiratory Journal*, the *American Journal of Critical Care Medicine*, *Thorax*, *Chest* and *Critical Care Medicine*, and has 400 publications of his own.



S. Ewig

S. Ewig is head of the Respiratory Medicine and Infectious Diseases Department at the Thoraxzentrum Ruhrgebiet (Bochum, Germany), a cooperation of several hospitals including one in Herne and one in Bochum, which provide the core services. He obtained his medical qualifications from the University of Bonn (Bonn, Germany) and the University of Heidelberg (Heidelberg, Germany) before undertaking a postdoctoral year at the University of Barcelona. He is a clinical specialist in internal medicine, respiratory medicine, intensive care medicine, infectious diseases, allergology and sleep medicine. His scientific engagement is mainly in the field of pulmonary infectious diseases. He has published extensively in all leading respiratory and infectious disease journals, with more than 200 peer-reviewed papers (including more than 100 original articles), in addition to numerous chapters in books and monographs. He has authored and co-authored several important national and international guidelines on the management of pneumonia. Another field of interest is medical ethics. Several contributions in this field have gained widespread public interest. S. Ewig is a member of the European Respiratory Society where he is currently secretary of the scientific Assembly Respiratory infections and has gained the HERMES qualification certificate. After several years on the editorial board of the *European Respiratory Journal*, he is now a member of its international advisory board. In addition, he was elected Fellow of the American College of Chest Physicians (FCCP), and has served as national governor for several years.

Preface



For decades, ventilator-associated pneumonia (VAP) has been thought to be the most important complication of intensive care medicine. A meta-analysis of studies published in the 1990s calculated the incidence of VAP, which is equivalent to 16.5 cases per 1,000 patient days. Attributable mortality due to VAP was estimated to be 20–40%, although the range in different studies was very broad. Healthcare costs related to VAP seem to be remarkable, in particular with regard to multidrug-resistant pathogens. A controversial debate about the management of VAP occurred in the literature at the beginning of the century, but latterly the discussion has wound down. The latest VAP guidelines were published in 2005 by the American Thoracic Society/Infectious Diseases Society of America, and a consensus paper was published in *Intensive Care Medicine* in 2009; however, the number of VAP studies has decreased dramatically.

A major problem with VAP is that there is no established gold standard for its diagnosis. The diagnosis of VAP is clinical, taking chest radiographs, clinical signs and symptoms into account. However, the spectrum of differential diagnosis is broad. The improvement of radiological procedures, implementation of new biomarkers into the diagnostic algorithm, and political decisions has reduced the number of patients diagnosed with VAP. 5 years ago the Center of Disease Control (Atlanta, GA, USA) declared a “zero VAP” programme, postulating that VAP is a hygienic problem and could be solved by infection control measurement alone. Health assurance no longer reimbursed for VAP. Since then the diagnosis of VAP has disappeared from the ICD codes and has been substituted by ventilator-associated tracheobronchitis or sepsis; the first is very similar to VAP and hard to distinguish in an individual patient, the latter is a typical complication of VAP with high mortality.

VAP is still a problem and although it may have been overestimated in the past, it is underestimated today, mainly in the USA. Previously, infection control had been able to reduce the incidence, but infectious disease complications are immanent in intensive care medicine depending on the severity of the disease and the risk factors (age and comorbidities) of the patients, therefore zero VAP will never be possible. The absence of clinical studies in this field and the lack of guidelines make it difficult to establish an evidence base for the management of this disease entity, which is still responsible for high mortality and morbidity and a high proportion of costs. Therefore, this Monograph is valuable from different perspectives. It summarises the current knowledge about VAP and is therefore a guide for the management of VAP using the best evidence available. However, it allows for an opening of controversy about VAP, which may lead to new scientific activity in the field. I want to congratulate the Guest Editors for this excellent Monograph, which will be of interest to either basic scientists or clinicians, and may have an impact on healthcare policy.

Editor in Chief
T. Welte

Introduction

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Nosocomial pneumonia, and particularly ventilator-associated pneumonia (VAP), is the second most frequent intra-hospital infection. The incidence of VAP has decreased in the last 5 years, from 14 to 9–10 cases per 1,000 days of mechanical ventilation. This has been an important achievement but nosocomial pneumonia and VAP still carry very high rates of morbidity and mortality and high financial costs.

In this issue of the *European Respiratory Monograph* we have tried to attract new information in the field of nosocomial pneumonia and VAP and to appeal to physicians that directly or indirectly (microbiologists) manage this type of respiratory infection daily. Updates on the new advances in the aetiopathogenesis, epidemiology, diagnosis (including biomarkers) and treatment are provided by renowned authors. New treatment approaches and new antibiotics have also been reviewed and are presented by experts in the field. With regards to microbial aetiology, viruses and fungi are reviewed as potential causes of VAP by clinicians and are discussed in a chapter focussing on fungal VAP. Ventilator-associated tracheobronchitis, a highly controversial entity, is also discussed in one of the chapters. The chapters that deal with what we have learnt from animal models and subsequent preventive measures provide new and relevant information.

Overall we believe that this Monograph is original as it includes new information, which has been published in the last 5 years. We want to thank all authors for their excellent contributions which, with without doubt, will help in the management of this important problem.

Statement of interest

S. Ewig has received fees for speaking and fees for research from Brahms (now Thermofisher). A. Torres has received speaking fees from Astellas, MSD and Pfizer, and research grants from Pfizer and Covidien. He is on the advisory boards of Astellas, MSD and Covidien.