The Challenge of Identifying Resistant-Organism Pneumonia in the Emergency Department: Still Navigating on the Erie Canal?

Rita Murri1 and Gennaro De Pascale2
Departments of 1Infectious Diseases and 2Anesthesiology and Intensive Care Medicine, Catholic University of Rome, Italy

(See the article by Shorr et al, on pages 193–8.)

In 2005, a new epidemiological category of lower respiratory tract infections, healthcare-associated pneumonia (HCAP), was created [1]. Patients with HCAP are frequently infected with multidrug-resistant organisms (MROs) [2, 3], making HCAP a distinct entity with unique microbiological features more resembling nosocomial pneumonia than community-acquired pneumonia. Methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa have been reported as leading pathogens of HCAP [2, 4]; however, typical community-acquired respiratory pathogens (ie, Streptococcus pneumoniae) cannot be excluded as an etiologic agent [5].

Patients with risk factors for HCAP must, like patients with other nosocomial respiratory infections, be treated urgently and appropriately [1]. It is well known that, in severe infections, rapid clearance of pathogens is the central determinant of outcome, and rapid resolution of infection-driven systemic activation of inflammatory pathways is crucial to prevent multiorgan dysfunction syndrome. Early and appropriate empirical antibiotic therapy is an important predictor of mortality and morbidity in serious infections, such as ventilator-associated pneumonia, septic shock [6–9], and even HCAP [2, 4, 5, 10, 11]. Inappropriate initial antibiotic therapy in HCAP is more frequent in cases involving MRSA, antibiotic-resistant Enterobacteriaceae, and nonfermenting gram-negative germs, and is associated with increased hospital mortality. Disease in a quarter of hospitalized patients with HCAP is severe enough to cause death [2, 4, 5, 10, 11]. On the other hand, antibiotic overuse could harm patients [12] and potentially lead to increased antibiotic resistance, higher rates of Clostridium difficile infection, and allergic reactions, and it may delay a definitive diagnosis if pneumonia is assigned prematurely as a diagnosis. Unnecessary and inappropriate use of antibiotics may also increase costs of care.

The American Thoracic Society/Infectious Diseases Society of America (ATS/IDSA) HCAP definition includes the following risk factors: hospitalization in the preceding 90 days, residence in long-term care facility (LTCF), home infusion therapies and wound care, chronic dialysis, and close contacts (ie, family members) with documented MRO colonization [1]. The strict application of these criteria leads to the use of broad-spectrum empirical antimicrobial treatment in all patients who have been recently in contact with healthcare facilities. However, it is noteworthy that individual ATS/IDSA criteria are not weighted in terms of their contribution to the risk of MROs, and they do not include some epidemiological aspects (ie, immunosuppression, high-risk healthcare professions, and pneumonia severity) that might be associated with a possible increase in this risk [13–15]. So it is conceivable why, during recent years, many authors have investigated HCAP epidemiology with the aim to understand the reliability of these criteria and whether their extensive application might involve overuse of precious antimicrobials for treatment of pneumonia potentially due to MROs [2–5, 11].

Given the limits of the current HCAP definition, more-restrictive risk-stratification approaches aimed to improve the risk-benefit balance associated with prescribing broad-spectrum antibiotic therapy are urgently needed to ensure appropriate use of therapy. Recently, clinical predictive scoring systems for identifying patients harboring...
MROs (e.g., MRSA, vancomycin-resistant Enterococci, P. aeruginosa, and extended-spectrum, β-lactamase–producing Enterobacteriaceae) upon hospital admission have been proposed [16–19]. The great interest they have raised is associated with the practical benefits of simple and rapid tools that enhance clinicians’ early adoption, at admission, of preventive measures for patients with presumed MRO colonization, and appropriate measures for those with potential MRO infection. Two recent studies [3, 20] have focused on the use of risk-stratification tools to predict, among HCAP patients, those really harboring MRO. In the first report, Shorr et al [3] described how a new scoring system that includes recent hospitalization, LTCF residence, chronic hemodialysis, and intensive care unit (ICU) admission might be an easy-to-use tool for guiding empirical antimicrobial therapy in patients with nonnosocomial pneumonia. More recently, Shreiber et al [20] observed in a cohort of patients with severe (defined as requiring ICU admission) nonnosocomial pneumonia that another decision rule, composed of immunosuppression status, long-term care admission, and prior antibiotic use, performed moderately well at screening for episodes due to MROs.

The article by Shorr et al [21] in this issue provides new relevant contributions to this debate. First, the authors overcome some of the limitations of the HCAP definition by moving attention from the best predictors of HCAP to the risk factors for MRO pneumonia. The risk score proposed and here validated by Shorr et al [21] proved more accurate in classifying patients with pneumonia due to MRO and in reducing the rate of unnecessary empirical treatment with broad-spectrum antibiotics. Validation of the score in a prospective study is strongly warranted.

Additionally, the study raises some relevant points of discussion. First, some risk factors for MRO pneumonia are identified or better elucidated. ICU admission, even in patients with nonnosocomial pneumonia for whom disease was severe enough to require intensive therapies, was correlated with a higher risk of harboring MRO. This suggests that patients who require ICU admission should receive broad-spectrum empirical antibiotic treatment, including coverage for MRSA and multidrug-resistant gram-negative rods, regardless of other risk factors. It would be interesting to verify whether certain components of the currently used pneumonia-severity scores, such as CURB-65, PSI, and, more recently, SMART-COP, CURXO-80, and the PIRO score, might be used to improve the accuracy in predicting MRO isolation upon hospital admission. Moreover, further research may investigate whether length of hospitalization, time from discharge, type of healthcare facility, residence in a nursing home or assisted-living facility [22], and prevalence of antibiotic-resistant bacteria in the local environment are useful in predicting the risk of MRO. Of note, the cohort described by Shorr et al [21] was quite critically ill, with about half of patients admitted to the ICU. Commonly, the frequency of microbiologically documented HCAP is higher in the ICU-admitted population [4]. This is due to the availability and extensive use of more reliable and accurate diagnostic methods (i.e., bronchoalveolar lavage), together with traditional tools (culture of blood, pleural fluid, and sputum specimens and urinary antigen tests for S. pneumoniae and Legionella pneumophila), in patients admitted to the ICU. Molecular detection methods for early detection, mainly involving real-time polymerase chain reaction, are under development [23]. These will help clinicians identify, more quickly, pneumonia-causing pathogens on the basis of their susceptibility profile and promptly de-escalate the initially administered broad-spectrum antibiotic regimen. Many studies demonstrated the effectiveness of the de-escalation strategy [24], although this is still far from being diffused in daily clinical practice [23]. In the present study [21], up to 15% of patients who did not harbor any validated risk factor for MRO were infected by an MRO and would have received an inappropriate empirical antibiotic regimen. Accurate and rapid emerging methods for the microbiologic diagnosis of infection with respiratory pathogens [23], as well as the implementation of biomarker-guided regimens (i.e., procalcitonin) [25], may reduce the risk of inappropriate therapy and antibiotic overuse.

In conclusion, the article by Shorr et al [21] provides precious information about the optimal management of patients presenting in the emerging department with nonnosocomial pneumonia. Further studies should evaluate the efficacy of using risk scores, together with rapid and accurate diagnostic strategies, to predict MRO pneumonia and improve clinical outcomes. Future treatment guidelines for patients with pneumonia must take into account the limitations of the HCAP definition. Until we change our “old mule” (i.e., the initial ATS/IDSA HCAP definition) with a “modern boat” (i.e., new evidence-based specific risk factors derived from large, prospective studies and more rapid and accurate diagnostic tools), we will continue to navigate on the Erie Canal.

Note

Potential conflicts of interest. All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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