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Healthcare-associated pneumonia: another nail in the coffin?

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The concept of healthcare-associated pneumonia (HCAP) to describe a form of nosocomial pneumonia originating outside the hospital was formally introduced in the 2005 revision of the American Thoracic Society–Infectious Diseases Society of America (ATS-IDSA) recommendations for diagnosis and treatment of nosocomial pneumonia [1]. The same year, it was corroborated by a large retrospective analysis of over 4,000 culture-positive episodes of pneumonia diagnosed in 59 US hospitals, finding that microbiological etiology, cost, and outcome of HCAP, using the definition of the 2005 ATS-IDSA guidelines, were more similar to hospital-acquired pneumonia (HAP) than to community-acquired pneumonia (CAP) [2]. The HCAP concept was not completely novel, however, as numerous previous studies reported that pneumonia in certain non-hospitalized patients, especially persons residing in long-term healthcare facilities and nursing homes [3], could be caused by nosocomial, gram-

negative bacteria in addition to common CAP pathogens such as *Streptococcus pneumoniae* and *Legionella pneumophila*. Furthermore, with advances in transplant medicine and onco-hematology as well as with the emerging AIDS epidemic in the 1980s and 1990s, an increasingly broad spectrum of pathogens, including opportunistic bacteria, fungi, and protozoa, and strongly determined by the type and severity of the immune defect, were identified as potential causes of CAP [4]. HCAP as defined in 2005 basically expanded upon the concept of nursing-home-acquired pneumonia, adding some more categories of patients with exposure to the healthcare environment: recent hospitalization or current receipt of hemodialysis, intravenous therapy, or home wound care; immunosuppression as such was not a component of the original definition. The recognition of HCAP as a distinct entity was coupled with strong incentives for broad-spectrum antibiotic therapy, as recommended empirical therapy was the same as that for late-onset HAP, consisting of a combination of two antibiotics with anti-pseudomonal activity with one directed against methicillin-resistant *Staphylococcus aureus* (MRSA). This recommendation was essentially based on the study by Kollef et al. [2] which found that *Pseudomonas aeruginosa* and MRSA were the predominant pathogens in HCAP, representing respectively 25 and 26 % of isolates.

Since then, both the ATS-IDSA definition of HCAP as a means to identify a peculiar type of high-risk pneumonia and the recommendation to treat HCAP as HAP have been challenged by new observational studies. The high proportion of *P. aeruginosa* and MRSA in HCAP as observed in the original paper was not confirmed by epidemiological studies from outside the USA [5–7]. Part of this discrepancy was attributed to different study designs, since retrospectively analyzing existing microbiological data sets, as compared to prospectively collecting data, tends to overestimate the prevalence of multidrug-resistant (MDR) pathogens [8]. In addition,

geographic variability, in terms of both organization of healthcare delivery and microbial ecology, may limit the validity of the original HCAP definition to identify a patient population requiring broader antimicrobial coverage than what is suggested for CAP. Whereas compliance with CAP guidelines, including ATS-IDSA guidelines prior to the introduction of HCAP, has been shown to be associated with improved outcome [9], this was not the case for adherence to the new ATS-IDSA guidelines which include recommendations for HCAP [10]. Taken together with the notion that the broad definition of HCAP results in high numbers of “community-onset” pneumonia episodes fulfilling HCAP criteria (up to 50 % in some tertiary centers) [11], these results raise the concern that adoption of the ATS-IDSA recommendations with respect to HCAP would lead to unjustified antibiotic escalation in a time when antibiotic use instead needs to be restrained to reduce further selection pressure.

What does the study by Jordi Vallés and the Spanish working group on CAP, published in this issue of *Intensive Care Medicine*, contribute to the discussion [12]? The paper fits in a series of multicentric epidemiologic studies that test whether HCAP versus CAP categorization translates into meaningful information regarding outcome and microbial etiology. First, in contrast to most previous reports, the authors did not find significant differences in outcome between HCAP and CAP. In contrast, by clearly separating HCAP from pneumonia in immunocompromised patients (similarly to what is done for CAP), they observed markedly higher mortality only in the latter category. Since the original definition for HCAP is built upon criteria representing recent exposure to the healthcare environment and not comorbidities as such, it encompasses a significant proportion of, but not all, immunocompromised patients; consequently, immunosuppression acts as a confounder and is probably responsible for at least some of the divergence between

studies. Second, the current study provides a reliable documentation of microbiological causes of CAP and HCAP in a region that is known to have a high antibiotic consumption and consequently high endemic levels of resistance [13]. Therefore, the finding that this high endemicity did not translate into a high prevalence of MDR pathogens in HCAP is unexpected, and it further casts doubt on the discriminative power of the HCAP criteria. Contrarily to most previous studies, the study by Vallés et al. [12] was restricted to ICU patients, which may have introduced a selection bias, and although there was a higher prevalence of therapeutic limitations in HCAP as compared to CAP, the analysis of the relationship between HCAP and outcome was restricted to patients without therapeutic limitation. Within this context, the authors stated that empirical therapy concordant with Spanish national CAP guidelines (and not the HCAP recommendations) would be sufficient for appropriate coverage of over 90 % of episodes of pneumonia, a contention that would need to be formally tested.

Should we discard altogether the HCAP concept? Probably not, but the definition clearly needs to be refined and adapted to different environments [8]. Individual components of the original HCAP definition may be used to construct prediction models for outcome or microbial etiology, together with other determinants of antibiotic exposure and comorbidity. Such prediction models for involvement of MDR pathogens in community-onset pneumonia are being developed [14, 15]. However, their universal applicability should not be taken for granted, as has been the case for the HCAP 2005 definition and therapeutic recommendations, unless these models survive rigorous testing in other healthcare settings and regions.

Conflicts of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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