Letter to the Editor

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Ventilator-associated pneumonia: Epidemiological changes or disregarded bundles?

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Abbreviations

VAP	ventilatory-associated pneumonia
ICU	intensive care unit

Dear Editor,

As we know, the introduction of new technologies and innovative invasive monitoring protocols have definitely revolutionized the role of intensive care medicine.

In fact, in the face of dysfunctions of vital functions as well as of a rapid decline of patient's self-sufficiency, different approaches of invasive support (cardiovascular, neurological and respiratory) are adopted. Among these, respiratory stabilization appears to be a priority through non-invasive as well as invasive ventilation techniques. These techniques, undianable tools for patients' rescue, certainly contribute to an alteration of the physiological respiratory dynamics resulting in mechanical changes that can cause infectious complications, such as ventilator-associated pneumonia (VAP), which is defined as the presence of a new or progressive radiographic infiltrate, along with the clinical findings suggesting infection (fever, purulent sputum, leukocytosis, desaturation), in patients intubated over 48 h [1]. But, how can invasive mechanical ventilation predispose to respiratory complications? Is it the effect of the lack of protective mucociliary mechanisms or rather does it represent the epiphenomenon of an increased infectious risk in a protected environment such as that of intensive care units (ICUs)? In general, infectious complications in ICU present both high health and social costs [2], drawing the attention of several Surveillance Departments with an estimation of about half of the hospital infections [3].

As reported by Storms et al. [4], in a multicenter national wide study, several risk factors contribute to prognosis, such as an age >65, pre-existing respiratory diseases, neoplasia, neurological and musculoskeletal dysfunctions.

It is clear, therefore, that the epidemiological explosion of respiratory complications correlates with the aging of the population and the chronicity of *frailty* states, whose decay favors the onset of pneumonia. In this regard, phlogistic events should be framed in the group of a reduced host response, without environmental factors.

But, is it right to reduce this phenomenon only to a mere adaptive deficit? In our opinion, this view would appear to be too simplistic and would not justify the significant epidemiologic gap between intensive care and inpatient departments. As reported in a study coordinated by the American Thoracic Society and the Infectious Disease Society of America, nosocomial pneumonias were around 25% of all infectious complications in the ICU setting and almost all were associated ventilators [1]. Data were confirmed by the evidence emerged from another American study, in which the prevalence of VAP reached 22.8% of cases with a cumulative risk of 1.3–8.5 per 1,000 ventilation-days [5]. Estimates were rather small compared to those reported by a similar European study, where the occurrences reached 14.5 per 1,000 ventilation days [6]. The reasons for such epidemiological differences could be deduced from both presumable care and protocol differences, although microbiologically no differences were observed, being *Pseudomonas* spp. and *Acinetobacter* spp. the most common isolated pathogens, with an increasing alarm of multidrug resistance cases associated with reduced survivals and worse prognosis [7]. It could therefore be concluded that VAPs today represent rather the normal

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consequence of a microbiological selective process due to the unjustified use of antibiotics in the past.

But, are there any prospective assistance strategies that can somehow reduce the risk of VAPs? The adoption of microbiological bundles seems to be the first prevention measure. As reported by Mogyoródi et al. [8], in a cohort of 535 patients, the adoption of daily humidification and nebulization protocols, associated with endotracheal suction, semi-orthopnoic position and dental hygiene, decreased by 21.5% incidence of pneumonia. At the microbiological analysis, the authors reported that *P. aeruginosa* represented the first pathogen (37%) followed by *S. maltophilia* (18%), whereas *A. baumannii* had an incidence of 6%, lower than those from opportunistic infections from *S. aureus*. However, protocols cannot disregard adequate education and training. In fact, the aforementioned bundle items are often unexpected, as reported by Yazdannik et al. [9]. In particular, the authors demonstrated that although much attention is paid to the prevention of contamination of ventilatory instruments, airway assistance and oral hygiene were nearly detrimental (33.76 and 13.66%, respectively).

In conclusion, although the VAPs are now common diseases in ICUs with well established risk factors, effective prevention strategies should embrace a proper staff training and the adoption of appropriate pharmacological regimes, limiting empirical therapies whose effects could be counterproductive.

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