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UPDATE IN INTENSIVE CARE MEDICINE: CRITICAL PATIENT WITH SERIOUS INFECTION

Update in intensive medicine on the critical patient with serious infection. What have we learned?

Puesta al día de medicina intensiva sobre el enfermo crítico con infección grave: ¿qué hemos aprendido?

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As has been commented in the introduction to this series,[1] the need to stay abreast of the most relevant information regarding the management of serious infections in critical patients justifies the present update, which now comes to a close. The general aim in this series has been to provide infected critical patients with early diagnostic and treatment support, in reference to both the most common infectious processes and those infections which for different reasons are less familiar to us.

From its creation, the Infectious Diseases Work Group (*Grupo de Trabajo de Enfermedades Infecciosas*, GTEI) of the Spanish Society of Intensive and Critical Care Medicine and Coronary Units (*Sociedad Española de Medicina Intensiva, Crítica y Unidades Coronarias*, SEMICYUC) has carried out research aiming to offer answers to many of the remaining specific questions related to infectious disease in the critical patient. The information obtained has helped to improve the care of patients with infection, and to establish preventive strategies in the rest of cases.

Since 1994, the ENVIN-UCI incidence study has controlled infections related to the use of medical devices during patient stay in the Department of Intensive Care Medicine, as well as the use of antibiotics –their types and indications, duration and suitability. This study has contributed considerable knowledge of the problem of nosocomial infections (NIs) in Spanish hospitals, and its results constitute a reference in this field. The work has also made a relevant contribution to training and enhanced awareness of the problem among the healthcare professionals. An aspect related to services management where the ENVIN-UCI study can make a significant contribution is the periodic obtainment of healthcare quality indicators allowing both the Unit and the hospital or institution to assess the situation and identify points offering possibilities for improvement. In a first evaluation based on these data, a detailed analysis was made of the epidemiology and impact of the infections acquired in the ICU, describing the rates and underlying etiologies of the main NIs – i.e., ventilator associated pneumonia, urinary infection associated to urethral catheterization, and primary and secondary bacteremia.[2] A review was made of the medical literature regarding the consequences of the different NIs, and special emphasis is placed on infections caused by increasingly prevalent multiresistant microorganisms.

Pneumonia is the second most frequent infectious complication in the hospital setting, and is the first most common infectious complication in the ICU. Eighty percent of all nosocomial pneumonias develop in patients with an artificial airway, and these conditions are referred to as ventilator associated pneumonia (VAP). Accordingly, the second review analyzed these problems in detail.[3]

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The experts reminded us that VAP is the most frequent cause of mortality among the different NIs in the ICU, fundamentally when caused by *Pseudomonas aeruginosa* and/or methicillin-resistant *Staphylococcus aureus* (MRSA), and moreover increases the number of days on mechanical ventilation and the mean duration of stay in the ICU and in hospital. Despite the available tests and techniques, the diagnosis of VAP is still based on the clinical findings. The presence of an opacity on the chest X-rays and of purulent tracheal secretions is essential for establishing the diagnosis. In addition, evaluation is required of the patient condition and of the existence of risk factors for pathogens that are difficult to treat. In early stage VAP, and in the absence of these risk factors, most empirical drug regimens offer correct coverage of the organisms which we may find. However, if the diagnosis of VAP is established in a patient who has been subjected to mechanical ventilation for more than one week, with antibiotic treatment or with risk factors, the therapeutic regimen must be individualized with a view to securing broad coverage of multiresistant microorganisms. Posteriorly, if the microbiological results are favorable, the treatment can be scaled down.

Based on the increasing concern over safety, we consider that maximum safety measures should be adopted in our Units (specifically, in our setting the "zero bacteremia" project has proved successful, and the "zero VAP" project is presently in the design phase). The prevention of NIs represents the best possible treatment strategy, and has been reviewed in extensive detail,[4] including common general measures for all infections and other specific measures for each particular location, based on the physiopathology of each case. In this context, the recommendation is to combine the reduction of risk factors and adherence to the clinical guides through the adoption of adequate educational measures. Preventive strategies with this scheme were considered, including specific measures only for the two NIs with the greatest impact in the ICU: ventilator associated pneumonia (VAP) and catheter-related bacteremia.

The influence and impact of antibiotics are observed in the patients who receive such treatments (clinical response, course and outcome) and in the ecosystem surrounding the patients (hospital flora). This impact is particularly visible in critical patients and in the endemic flora of the ICU. The set of norms and strategies developed to improve and optimize antimicrobials is referred to as antibiotic policy or stewardship, and consists of a series of first order measures in their application both in our Units and at all levels – hospital and primary care. This article describes a series of norms (decalogue of norms) and strategies (treatment de-escalation, antibiotic cycling, anticipative therapy and pharmacokinetic / pharmacodynamic parameters) that have been developed and applied in critical patients to optimize antimicrobial use with the aim of ensuring maximum effectiveness and minimum morbidity.[5]

Due to their importance and frequency, the most serious and frequent community-acquired infections found in the ICU, i.e., severe community-acquired pneumonia, meningitis, encephalitis and urinary tract infections, require frequent revision and updating, as has been done in the update dedicated to these disorders. Regarding pneumonias, emphasis is placed on the use of severity scales for assessing admission to Intensive Care, on evolutive monitorization based on biological markers, and on the importance of introducing early and adequate antibiotic treatment. Likewise, the importance of gram straining in cerebrospinal fluid for the etiological diagnosis of meningitis is underscored, along with the use of real-time polymerase chain reaction (RT-PCR) techniques and magnetic resonance imaging (MRI) for the etiological diagnosis of encephalitis. On the other hand, concern is expressed over the increase in the percentage of extended spectrum betalactamase (ESBL) producing strains of *Escherichia coli* and *Klebsiella pneumoniae* in Spain, which undoubtedly points to the need to reconsider empirical treatment, particularly in critical patients.[6]

Invasive aspergillosis is frequent in oncohematological patients. The symptomatology is extremely nonspecific; knowledge is therefore required of the opportune techniques and means for securing an early diagnosis. The review made clarifies the existing evidence regarding the clinical presentation, study methods and treatment of this disorder in critical oncohematological patients, who are increasingly admitted to our Units.[7]

Continuing in the field of the immune deficiencies, the evidence published in the last decade indicates that solid organ transplant recipient status, and the administration of chemotherapy for malignant hematological disease, clearly predispose patients to the development of both common and opportunistic viral infections, of both community origin and derived from organ donors and/or reactivation of a latent endogenous virus. Herpes virus (HV), and particularly cytomegalovirus (CMV) and Epstein-Barr virus (EBV), are the viruses most often found in such patients, together with the respiratory viruses. Treatment involves combining a reduction in the induced immune deficiency and the provision of antiviral therapy. A detailed and up to date review has been made of the literature relating to the epidemiology, pathogenesis, clinical manifestations and therapeutic approach to viral infections in these patients.[8]

Viruses likewise play an important role in serious infections in adult patients who in some cases require hospital admission and admission to Intensive Care –particularly in situations of adult respiratory distress syndrome (ARDS) and/or encephalitis. Infections produced by influenza and parainfluenza viruses, respiratory syncytial virus (RSV), herpes virus and adenovirus are the most common causes of these clinical conditions. A detailed and up to date review has also been made of the literature relating to the epidemiology, pathogenesis, clinical manifestations and therapeutic approach to viral infections in immunocompetent patients. On one hand, although VAP is most often of bacterial origin, the role of viruses as pathogens in such infections has recently been the subject of debate. Consequently, a brief review has been made of their etiopathogenic role in ventilator associated pneumonia. Although the significance of such viruses is still not clear, they must be taken into account particularly in cases characterized by a poor and prolonged course without microbiological isolations.[9]

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References

1. Palomar Martínez M, Zaragoza Crespo R. Introducción de la serie. Med Intensiva. 2010;34:254-5.
2. Olaechea PM, Insausti J, Blanco A, Luque P. Epidemiología e impacto de las infecciones nosocomiales. Med Intensiva. 2010;34:256-67.
3. Diaz E, Lorente L, Valles J, Rello J. Neumonía asociada a la ventilación mecánica. Med Intensiva. 2010;34:318-24.
4. Palomar M, Rodríguez P, Nieto M, Sancho S. Prevención de la infección nosocomial en pacientes críticos. Med Intensiva. 2010;34:523-33.
5. Alvarez Lerma F, Sierra Camerino R, Alvarez Rocha L, Rodríguez Colomo O. Política de antibióticos en pacientes críticos. Med Intensiva. 2010;34:600-8.
6. Blanquer J, Solé-Violán J, Carvajal J, Lucena F. Infecciones comunitarias que requieren ingreso en UCI. Med Intensiva. 2010;34:388-96.
7. Burghi G, Lemiale V, Bagnulo H, Bódega E, Azoulay E. Aspergilosis pulmonar invasiva en el paciente hematooncológico en las unidades de cuidados intensivos. Revisión de la literatura médica. Med Intensiva. 2010;34:459-66.
8. Salavert M, Granada R, Díaz A, Zaragoza R. Papel de las infecciones víricas en pacientes inmunodeprimidos. Med Intensiva. 2011;35:53-61.
9. Díaz A, Zaragoza R, Granada R, Salavert M. Infecciones víricas graves en pacientes inmunocompetentes. Med Intensiva. 2011;35:179-85.