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Economic impact of new forms of antimicrobial treatment for nosocomial pneumonia in cardiovascular intensive care units

Impacto económico de las nuevas formas de tratamiento antimicrobiano para neumonías nosocomiales en terapia intensiva cardiovascular

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To the Editor:

Nosocomial pneumonia (NP) are those that appear 48 hours after hospital admission, and they are the second leading cause of infection in general wards and the first cause in intensive care units (ICUs) worldwide. Its incidence has been reported between 10-20%, which can reach up to 20% in patients receiving artificial mechanical ventilation, and its mortality exceeds 50%[1-3]; that is why they are considered diseases of high morbidity, mortality and socio-economic impact.

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Early empirical treatment with broad-spectrum antimicrobial is the correct first step in order to reduce its mortality; however, this therapeutic potential may expose the patient to overdose of antibiotics, so de-escalation of these drugs is a strategy to replace them with a simple but effective therapy, after knowing the results of microbiological cultures and having a satisfactory clinical course[4-8].

According to Escudero *et al*.[9], Nightingale *et al*, in 1988, proposed the foundations for the application of the sequential antimicrobial therapy in hospitals; and they define it as the change of an antimicrobial treatment —with an intravenous parenteral formulation— for oral doses, using the same or another antibiotic with similar bacterial coverage and bioavailability, after successful clinical assessment from 48 to 72 hours from diagnosis and initiation of treatment, provided

that the digestive tract is patent[9].

Considering this situation and having concluded an investigation on the matter, it was decided to determine the economic impact of these new forms of antimicrobial therapy in these patients and its results deserve to be communicated.

Of patients with heart disease who were admitted to the cardiovascular ICU of the Celestino Hernández Robau University Hospital from January to December 2013, 116 were diagnosed with early or severe NP, in 57 (study group) sequential techniques were applied to escalate/de-escalate antimicrobials, which helped reduce the use of these drugs, microbial resistance, hospitals- stay and costs. Conventional treatment was applied to the rest.

Of these 57 patients, 47 [44 with early NP (88.0%) and 3 with serious NP (12.0%)] had a satisfactory progress in the assessment performed in the first 48-72 hours. In our case, the technique to de-escalate antimicrobials was performed with drugs that were intravenously used in most cases (**Table 1**), the rest received oral administration, but both met the necessary features to maintain clinical improvement and reduce costs, therefore the results were encouraging for the control of sepsis, and reduction of hospital stay and costs per patient (**Table 2**), despite the presence of non-fermentative Gram-negative bacteria.

The presence of comorbidities and antimicrobial history, among other factors, become very important because they can be associated with opportunistic and multiresistant microorganisms. These elements favor the suspicion of the causative agent, whereby the treatment according to the germ is achieved and opens the door for clinical stratification, escalated antimicrobial treatment, the assessment within 48-72 hours and the application of techniques to de-escalate these drugs as safe and cost-effective procedures[2-3].

Several authors[5,6,9] have suggested that in most patients with NP a good clinical response at three days of treatment is obtained, allowing antimicrobial de-escalation even in patients with fever; but it is not recommended for those with bacteremia, alcoholism or mul-

Table 1. Treatment of NP at cardiovascular ICUs using the technique to scale/de-escalate antimicrobials.

NP	Culture	Germ	Sensitivity	Escalate	De-escalate	Saving
Early	Tracheal aspirate	Pseudomonas aeruginosa	Amikacin and ciprofloxacin	Ceftazidime	Amikacin	330,30
Early	Sputum	Escherichia coli	Amikacin and ciprofloxacin	Ceftazidime + amikacin	Amikacin	556,95
Early	Sputum	Streptococcus pneumoniae	Penicillin and cefazolin	Ceftazidime	Cefazolin	440,95
Early	Sputum	Klebsiella pneumoniae	Ceftriaxone ceftazidime and amikacin	Ceftazidime	Ceftriaxone	326,70
Early	Sputum	Pseudomonas aeruginosa	Ceftazidime and amikacin	Ceftriaxone + amikacin	Amikacin	244,80
Early	Sputum	Streptococcus pneumoniae	Ceftriaxone and Cefazolin	Ceftriaxone	Cefazolin	138,0
Early	Tracheal aspirate	Staphylococcu s aureus	Oxacillin, vancomycin and cefazolin	Cefuroxime	Cefazolin	70,50
Serious	Tracheal aspirate	Staphylococcu s aureus	Vancomycin	Ceftazidime + amikacin + metronidazol	Vancomycin	571,80
Serious	Tracheal aspirate	Escherichia coli	Amikacin, ceftazidime and ciprofloxacin	Meronem + amikacin	Ceftazidime + amikacin	1054,50
Serious	Tracheal aspirate	Acinetobacter baumannii	Amikacin, ceftazidime and ciprofloxacin	Meronem + amikacin	ceftazidime + amikacin	201,15

Table 2. Clinical and economic parameters.

Parameter	Control group		Study group	
	Early NP	Serious NP	Early NP	Serious NP
Average length of stay (days)[Ω]	8,5	8,5	5,5	6,3
Deceased (Nº)[ΩΩ]	5	13	-	3
Cost (Cuban pesos)	506,90	1402,26	167,14	440,52
Cost savings	-	-	**339,76**	**961,74**

[Ω] t=300.29; p=0.000
[ΩΩ] χ^2=12.46; p=0.0004

tilobar injuries shown in chest radiograph. The early use of oral administration reduces antimicrobial resistance, adverse effects of drugs and hospital stay; it does not increase mortality, and is less expensive than endovenous administration[6-8].

For these reasons, the use of this therapeutic approach is very useful for any healthcare system to the patient in serious conditions.

REFERENCES

1. Cabrera RA, Laguna HG, Villagómez OAJ, Méndez RR, Guzmán GR. Neumonía adquirida en hospitales. Un problema común que merece mayor atención. Med Int Mex. 2009;25:31-7.
2. Jordà Marcos R, Torres Martí A, Ariza Cardenal FJ, Álvarez Lerma F, Barcenilla Gaite F, Comisión de Expertos del Grupo de Trabajo de Enfermedades Infecciosas de la Sociedad Española de Medicina Intensiva, Crítica y Unidades Coronarias (GTEI-SEMICYUC), Área de Trabajo de Tuberculosis e Infecciones Respiratorias de la Sociedad Española de Patología del Aparato Respiratorio (TIR-SEPAR) y Grupo de Estudio de Infección Hospitalaria de la Sociedad Española de Enfermedades Infecciosas y Microbiología Clínica (GEIH-SEIMC). Recomendaciones para el tratamiento de la neumonía intrahospitalaria grave. Enferm Infecc Micro-biol Clin. 2004; 22:471-85.
3. Mangino JE, Peyrani P, Ford KD, Kett DH, Zervos MJ, Welch VL, *et al*. Development and implementation of a performance improvement project in adult intensive care units: overview of the Improving Medicine Through Pathway Assessment of Critical Therapy in Hospital-Ac-quired Pneumonia (IMPACT-HAP) study. Crit Care [Internet]. 2011 [ci-tado 23 Oct 2014]; 15:R38. Disponible en: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3222076/pdf/cc9988.pdf
4. Höffken G, Niederman MS. Nosocomial pneumonia: the importance of a de-escalating strategy for antibiotic treatment of pneumonia in the ICU. Chest. 2002;122:2183-96.
5. Niederman MS, Soulountsi V. De-escalation therapy: is it valuable for the management of ventilator-associated pneumonia? Clin Chest Med. 2011;32: 517-34.
6. Apisarnthanarak, A. Bhooanusas, N. Yaprasert, A. Carbapenem de-escalation therapy in a resource-limited setting. Infect Control Hosp Epidemiol. 2013;34:1310-3.
7. Dünser MW, Festic E, Dondorp A, Kissoon N, Ganbat T, Kwizera A, *et al*. Recommendations for sepsis management in resource-limited settings. Intensive Care Med. 2012;38:557-74.
8. Maldonado-Ortiz A, Niederman MS, Arancibia HF, Osorio J, Regalado PJ, Sereno B, *et al*. Informe de la conferencia de Consenso Interamericana sobre Neumonía Nosocomial y Asociada a la Ventilación Mecánica. Rev Inst Nal Enf Resp Mex. 2005;18:298-307.
9. Escudero D, Blanco A, Quindós B. Terapia secuencial con medicamentos. Conversión de la vía intravenosa a la vía oral. ¿Una buena estrategia para disminuir la bacteriemia relacionada con catéter?. Med Intensiva. 2014;38:99-103.
10. Johanson WG, Pierce AK, Sanford JP, Thomas GD. Nosocomial respiratory infections with Gram negative bacilli. The significance of colonization of the respiratory tract. Ann Intern Med. 1972;77:701-6.