



Review

Usefulness and prognostic value of biomarkers in patients with community-acquired pneumonia in the emergency department[☆]Agustín Julián-Jiménez^{a,*}, Juan González del Castillo^b, Francisco Javier Candel^c^a Servicio de Urgencias, Complejo Hospitalario Universitario de Toledo, Toledo, Spain^b Servicio de Urgencias, Hospital Universitario Clínico San Carlos, Madrid, Spain^c Servicio de Microbiología Clínica, Hospital Clínico Universitario San Carlos, Madrid, Spain

ARTICLE INFO

Article history:

Received 29 December 2016

Accepted 16 February 2017

Available online xxx

Keywords:

Biomarkers

Bacteraemia

Community-acquired pneumonia

C-reactive protein

Emergency department

Lactate

Mortality

Proadrenomedullin

Procalcitonin

Prognosis

ABSTRACT

Between all patients treated in the Emergency Department (ED), 1.35% are diagnosed with community-acquired pneumonia (CAP). CAP is the main cause of death due to infectious disease (10–14%) and the most frequent reason of sepsis-septic shock in the ED. In the last decade, the search for objective tools to help establishing an early diagnosis, bacterial aetiology, severity, suspicion of bacteremia and the prognosis of mortality has increased. Biomarkers have shown their usefulness in this matter. Procalcitonin (obtains the highest accuracy for CAP diagnosis, bacterial aetiology and the presence of bacteremia), lactate (biomarker of hypoxia and tissue hypoperfusion) and proadrenomedullin (which has the greatest accuracy to predict mortality which in combination with the prognostic severity scales obtains even better results).

The aim of this review is to highlight recently published scientific evidence and to compare the utility and prognostic accuracy of the biomarkers in CAP patients treated in the ED.

© 2017 Elsevier España, S.L.U. All rights reserved.

Utilidad y valor pronóstico de los biomarcadores en los pacientes con neumonía adquirida en la comunidad en los servicios de urgencias

RESUMEN

Al 1,35% de los pacientes del servicio de urgencias (SU) se les diagnostica neumonía adquirida en la comunidad (NAC), principal causa infecciosa de muerte en nuestro entorno (10–14%) y origen de la mayoría de sepsis-shock sépticos en los SU. En la última década se ha acentuado la búsqueda de herramientas de ayuda para establecer un diagnóstico precoz, la etiología, la gravedad, la sospecha de bacteriemia y el pronóstico de mortalidad en la NAC. Para ello los biomarcadores han demostrado gran utilidad: procalcitonina (mayor rendimiento diagnóstico de NAC, etiología bacteriana y coexistencia de bacteriemia), lactato (marcador de hipoxia e hipoperfusión tisular) y proadrenomedulina (con la mayor capacidad de predecir mortalidad y combinada con las escalas pronósticas de gravedad obtiene aún mejores resultados). Esta revisión quiere poner de manifiesto las evidencias científicas recientes, aclarar las controversias existentes y comparar la utilidad y capacidad pronóstica de los biomarcadores en los pacientes con NAC en los SU.

© 2017 Elsevier España, S.L.U. Todos los derechos reservados.

Palabras clave:

Servicio de urgencias

Neumonía adquirida en la comunidad

Pronóstico

Mortalidad

Biomarcadores

Procalcitonina

Proadrenomedulina

Proteína C reactiva

Lactato

Bacteriemia

[☆] Please cite this article as: Julián-Jiménez A, González del Castillo J, Candel FJ. Utilidad y valor pronóstico de los biomarcadores en los pacientes con neumonía adquirida en la comunidad en los servicios de urgencias. Med Clin (Barc). 2017. <http://dx.doi.org/10.1016/j.medcli.2017.02.024>

* Corresponding author.

E-mail address: agustinj@sescam.jccm.es (A. Julián-Jiménez).

Introduction

The incidence of community-acquired pneumonia (CAP) ranges from 2 to 15 cases/1000 inhabitants/year, depending on the geographic area and the season of the year,^{1,2} higher in male subjects, smokers, ≥ 75 years of age, with comorbidities or immunosuppressed.³ Its diagnosis has increased in the emergency department (ED), going from 0.85% of patients seen in 2001 to 1.35% in 2011.³ 51% correspond to patients ≥ 70 years of age,³ a subgroup with more difficult diagnosis,⁴ higher clinical severity and mid- to long-term mortality.^{1,3}

CAP represents the leading cause of death from infectious disease in the Western world (10–14%)^{1,2} and the origin of most sepsis and septic shock cases treated in EDs,³ as well as the first infectious cause (9%) of admission to the intensive care unit (ICU), required by 2.6% of CAP.^{3,5} Hence the importance of CAP in the EDs, since 75% of them are assessed at some point in these units,⁶ also the “ED impact on CAP”, as it is in this department where the initial but essential decisions are made, determining disease progression and patient safety.^{6,7} There is great variability in the management of the diagnostic-therapeutic aspects of CAP,^{6,8} which is one of the reasons for differences in admission rates (22–61%), achievement of microbiological diagnosis, request for complementary studies, choice of antimicrobial regimen or intensity of care offered.^{6,8,9} Therefore, it is the most relevant infection in the ED. Therefore, correctly determining the need for admission (when), location (where) and intensity of care (how) will determine prognosis, mortality, requests for tests and microbiological studies, antibiotic regimen, intensity of clinical observation and the use of social-health resources (costs).⁶ In this sense, the implementation of clinical practice guidelines (CPG)^{8,9} together with the use of prognostic severity scores⁶ and inflammatory response and infection biomarkers (IRIBM)^{10,11} improve treatment and admission adequacy, progression, hospital stay and mortality.^{8,9}

Recently, the search for help tools has been intensified in order to establish early diagnosis, prognosis, severity, suspicion of bacteraemia and possible bacterial aetiology^{13,14} when CAP is suspected, even during the first evaluation or targeted triage.¹² Multiple studies, reviews and meta-analyses demonstrating the utility of IRIBM in EDs have been recently published,¹³ especially on CAP,^{10,11} which have included C-reactive protein (CRP), interleukins (IL) 6 and 8, proendothelin-1 (proET1), copeptin, D-dimer, atrial natriuretic propeptide (proANP) or cortisol, among others.^{10,13–17} Mid-regional proadrenomedullin (MRproADM) stands out among them as a predictor of mortality.^{11,15,18–27} Procalcitonin (PCT) also stands out as a sensitive and specific marker regarding targeting the pathogen causing the CAP,^{15,28–30} its clinical course (severe sepsis and septic shock),³⁰ the possibility of bacteraemia,^{14,31,32} mortality³³ and as a guide to antibiotic treatment.^{6,13} And finally, lactate, the best marker for hypoperfusion and tissue hypoxia, which is included in all the recommendations for assessment of patients with sepsis and septic shock.¹³

This review aims at highlighting recently published scientific evidence, clarifying existing controversies, and comparing the usefulness and prognostic capacity of IRIBM in patients with CAP. And from it, generate different recommendations that can help define the role of these in the assessment of CAP.

Strategy for article review and selection

A systematic search was made in the PubMed, Web of Science, Scopus and EMBASE databases, combining as keywords: (community-acquired pneumonia or pneumonia) and (prognosis or prognostic indices or mortality or bacteraemia) and (biomarkers, adrenomedullin, procalcitonin, lactate). We used filters to select

adult patient (>15 years of age) articles related to ED, in English and Spanish, from 1-01-2001 to 30-11-2016. The ones considered relevant were chosen at the discretion of the authors. Articles on patients who were immunosuppressed, neutropenic, with human immunodeficiency virus infection, transplanted, splenectomised, or under immunosuppressive treatment were excluded, as well as articles developed in a hospital ward or intensive care unit. The search was extended manually to other articles that were considered of interest. In this way 4823 results were found, of which 185 articles were initially selected (editorials, scientific letters, originals, short originals, reviews and meta-analyses). Ultimately, 53 articles were selected that met the objectives of the review.

Biomarkers in community-acquired pneumonia

A biomarker is defined as that molecule measurable in a biological sample whose concentrations are indicative of the degree of inflammatory response and help in monitoring response to treatment and as a guide to antibiotic therapy.¹³ The IRIBM should provide additional information to that obtained with the patient's clinical data and help in decision making.^{6,13} The main benefits of IRIBM sought in CAP are:

1. Establish an early diagnosis of bacterial CAP (versus other cardiovascular and inflammatory diseases, viral infections, etc.).¹³
2. Identify patients with severe CAP with the highest sensitivity and positive predictive value (PPV),¹³ as well as to rule out cases of suspected bacteraemia³⁴ with the greatest specificity and negative predictive value (NPV).¹⁸
3. Stratify the risk of poor outcome, complications and mortality independently or in combination with the severity indices, to indicate hospital admission and the most appropriate department/unit.^{28,33}

Besides the clinical condition, characteristics and age of the patient, the type of pathogen and the cut-off point adopted, other factors must be taken into account when interpreting the results of each IRIBM. Consideration should be given to whether the patient has taken antibiotics in the previous 72 h (may decrease values), duration of symptomatology and possible bacterial aggression and the very kinetics of IRIBM, which will determine their usefulness and which are the most indicated in the ED.¹³

C-reactive protein

CRP is released in hepatocytes following stimulation of IL-6 and IL-8 in response to any type of inflammation, viral, bacterial or mixed CAP infections.¹³ It poses limitations due to its slow kinetics, which can lead to false negatives at the beginning of the CAP and a delay in its clearance after adequate treatment and clinical condition resolution.¹³ It offers a lower diagnostic and prognostic capacity (prediction of bacteraemia and mortality)^{6,15,33} for bacterial CAP^{13,23} than PCT or MRproADM. In addition, its values depend on age, sex and race, so it would be necessary to adjust and interpret its serum concentrations in each patient.¹³ Ruiz-González et al.³⁵ published a good CRP performance (with a cut-off point >200 mg/l) to detect CAP compared to other respiratory infections, with an area under the curve-receiver operating characteristic (AUC-ROC) of 0.84 (95% CI: 0.82–0.87).

High sensitivity CRP (hsPCR) obtains greater specificity for the diagnosis of bacterial infection. In the elderly, with a cut-off point of 61 mg/l, an AUC of 0.76 (95% CI: 0.72–0.79) has been obtained to diagnose CAP in comparison with other acute pulmonary processes, with a relative risk (RR) of 3.59 (95% CI: 2.35–5.48; $p < 0.0001$).³⁶

Download English Version:

<https://daneshyari.com/en/article/8763392>

Download Persian Version:

<https://daneshyari.com/article/8763392>

[Daneshyari.com](https://daneshyari.com)