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Clinical characteristics and outcome of elderly patients with community-onset bacteremia

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Summary Objectives: To evaluate characteristics and prognostic factors of community-onset bloodstream infection (Co-BSI) in elderly patients (≥ 65 years).

Methods: Analysis of a prospective series of Co-BSI at a tertiary hospital (2005–2011). Predictors of 30-day mortality were established by logistic regression analysis.

Results: A total of 2605 episodes of Co-BSI were identified and empirical antibiotic treatment was inappropriate in 404 (15.5%). Thirty-day mortality was 11.4% and was independently associated with age (75–84 years OR 1.9, 1.37–2.67; ≥ 85 OR 2.85, 1.93–4.21), previous hospitalization (OR 1.45, 1.05–2.00), a fatal underlying disease (OR 2.81, 2.10–3.76), neutropenia (OR 2.62, 1.54–4.43), absence of fever (OR 1.99, 1.26–3.12), shock (OR 7.96, 5.83–10.89), inappropriate empirical treatment (OR 1.49, 1.03–2.16), isolation of *Staphylococcus aureus* (methicillin-resistant OR 2.83, 1.38–5.78; methicillin-susceptible OR 3.24, 1.98–5.32), enterococci (OR 2.02, 1.14–3.59) or *Enterobacteriaceae* resistant to third-generation cephalosporin (3GCR-E) (OR 1.96, 1.16–3.32) and having endovascular non-catheter (OR 4.64, 2.51–8.59), abdominal (OR 3.65, 2.12–6.27), skin/soft tissue (OR 3.48, 1.90–6.37), respiratory (OR 2.80, 1.75–4.50) or unknown (OR 1.83, 1.17–2.87) source.

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Conclusions: Age is a prognostic factor and appropriateness of empirical treatment is the only modifiable variable. *S. aureus*, enterococci and 3GCR-E may be the microorganisms with major prognostic significance; hence efforts should be made to improve their management.

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Introduction

Bacteremia is a leading cause of morbidity and mortality,¹ being the eleventh cause of death in the United States.² The incidence of sepsis increases with age, most markedly in people over 85 years³ and multiple factors contribute to this phenomenon, such as comorbidities, altered immune function, institutionalization and declining performance status.⁴ Aging is also a predictor of mortality in patients with sepsis and bacteremia.^{3,5,6} It is expected that by 2060 the number of people aged 65 years or over will account for 29.5% of the EU-27's population (17.5% in 2011) and therefore bacteremia and sepsis may become a major public health issue.⁷ Despite all this facts, there is a shortage of studies on sepsis specific to older patients.⁸

In patients with bloodstream infections, appropriate empirical antibiotic treatment has been commonly associated with a better outcome.⁹ In order to choose an appropriate empirical antibiotic treatment it is fundamental to be aware of the pathogen distribution at different infection sites and of major local resistance trends.¹⁰ It is important to take into account that age may influence both of these factors.

Although several studies on bacteremia in the elderly have been recently published, most of them have compared younger with elderly patients.^{5,6,11} The present study represents the largest series focused specifically on patients over 65 years aimed to describe the age-related characteristics of community-onset bacteremia and the predictors of 30-day mortality in this population.

Materials and methods

Setting and data collection

The study was performed in a 700-bed university center that provides specialized and broad medical, surgical, and intensive care for an urban population of 500,000 people. Since 1991 our institution has carried out a blood culture surveillance program identifying and monitoring all patients with bacteremia. The collected data was entered in a specific database designed for this program. Patients were prospectively followed-up for 30 days after the onset by a senior infectious disease specialist who assessed the patient's medical history, physical examination, the results of other microbiological tests and complementary imaging explorations in order to determine the source of infection and to recommend appropriate antibiotic treatment.

Study population

From January 2005 to December 2011, elderly patients (≥ 65 years old) with community-onset bacteremia were included. The study was approved by the Ethics Committee board of our institution.

Definitions

Community-onset bloodstream infections (CO-BSI) were defined as those in which the first positive blood culture was obtained ≤ 2 days from admission and included health-care-associated (HCA-BSI) and community-acquired (CA-BSI) bloodstream infections. HCA-BSIs were defined as those CO-BSI diagnosed in patients having at least one of the following characteristics: 1) Being discharged within 30 days from an acute care hospital. 2) Receiving hemodialysis or any kind of intravenous therapy provided by a hospital-dependent facility within 30 days prior to the bloodstream infection. 3) Residence in a nursing home or long-term care facility. CA-BSIs were defined as CO-BSI not fulfilling criteria for HCA-BSI.

For the purpose of analysis, age was stratified in three groups: I) 65 to 74 years-old; II) aged 75 to 84; and III) aged 85 or over.

Fever was defined as an axillary temperature $>37^\circ\text{C}$ or a rectal or an oral $>37.8^\circ\text{C}$ as measured by an electronic thermometer.¹² The systemic response to BSI was classified as septic shock as previously defined by the American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference.^{13,14}

To consider a positive blood culture as indicative of significant bacteremia the following criteria were used: 1) certain pathogens, such as *Staphylococcus aureus*, *Streptococcus pneumoniae*, enterococci, *Neisseria meningitidis*, gram-negative bacilli and *Candida* species isolated from any culture sample represented true bacteremia or fungemia; 2) common skin contaminants such as coagulase-negative staphylococci (CoNS), *Corynebacterium* spp., *Bacillus* spp, *Lactobacillus* spp., or *viridians* streptococci from two or more cultures samples drawn from different sites with the same antibiogram were considered true bacteremia.¹⁵

Empirical therapy was considered appropriate when the initial regimen administered within the first 24 h after blood cultures and before knowing the susceptibility testing results, was active in vitro against all the isolated bacteria and the dosage and route of administration were in accordance with the current medical standards. Therefore, empirical therapy was considered inappropriate when antibiotics were given past the first 24 h after blood

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