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Original article

Evaluating the management of 493 patients presenting with bacteremia in 23 northern French hospitals☆

Évaluation de la prise en charge de 493 bactériémies dans 23 hôpitaux du nord de la France

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Abstract

Objectives. – We aimed to update the epidemiology of bacteremia and evaluate their management and short-term outcome.

Methods. – We conducted a prospective multicenter survey from October to November 2011. Consecutive patients with at least one positive blood culture (BC) were included in the study. We evaluated the type and adequacy of empirical and documented antibiotic therapy, time to active antibiotic therapy, compliance with guidelines, and 10-day outcome.

Results. – A total of 23 public and private hospitals and 633 patients (493 true pathogens and 140 contaminants) were included in the study. Patients' wards were medicine (57%), surgery (19%), intensive care (14%), onco/hematology (3.7%), pediatrics (3.4%), infectious diseases (1.8%), and obstetrics (1.2%). Main pathogens were *Escherichia coli* (36%), *Staphylococcus aureus* (16%), coagulase-negative staphylococci, and *Klebsiella* sp. (8% each). A total of 43 (8.7%) multidrug-resistant strains were observed, including 26 extended-spectrum beta-lactamase strains and 15 methicillin-resistant *S. aureus* strains. An antibiotic active against the isolated pathogen was used in 74% of empirical and 96% of documented therapies. Median time between BC and administration of an active drug was 0.61 day. Empirical antibiotic therapies were protocol-compliant in 77% of cases. Few (4%) patients with contaminated BC received an antibiotic therapy (all inappropriate). Day-10 mortality was 12.1%, higher in patients presenting with severe sepsis or septic shock (22.5%) than in patients presenting with non-severe bacteremia (7.1%; $P < 0.0001$).

Conclusion. – The management of bacteremia seems satisfactory in these volunteer hospitals but bacteremia remains a severe infection.

Keywords: Antibiotics; Bacteremia; Antimicrobial stewardship

Résumé

Objectifs. – Actualiser les connaissances épidémiologiques des bactériémies et évaluer la prise en charge et le devenir des patients présentant des bactériémies.

Méthodes. – Enquête multicentrique prospective d'octobre à novembre 2011 auprès de patients consécutifs ayant une hémoculture positive. Données évaluées : type et conformité des antibiothérapies probabilistes et documentées, délai avant administration d'un antibiotique actif, adhésion au référentiel local et devenir à j10.

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Résultats. – Vingt-trois établissements publics et privés et 633 patients ont été inclus, dont 493 patients avec un pathogène et 139 un contaminant. Les patients venaient des services de médecine (57 %), chirurgie (19 %), réanimation (14 %), pédiatrie (3,4 %), onco-hématologie (3,7 %), infectiologie (1,8 %) et obstétrique (1,2 %). Principaux pathogènes : *Escherichia coli* (34 %), *Staphylococcus aureus* (16 %), staphylocoque à coagulase négative et *Klebsiella* sp. (8 % chacun). Il y avait 43 (8,7 %) BMR, dont 26 BLSE et 15 SARM. Un antibiotique actif a été observé dans 74 % des cas en probabiliste et 96 % en documenté. Le délai médian entre hémoculture et 1er antibiotique actif était de 0,61 jours. L'antibiothérapie probabiliste était conforme au référentiel local dans 77 % des cas. Seules 4 % des contaminations ont été traitées. La mortalité à j10 était de 12,1 %, plus élevée en cas de sepsis grave ou de choc septique (22,5 %) que pour les bactériémies simples (7,1 % ; $p < 0{,}0001$).

Conclusion. – La prise en charge initiale des bactériémies dans ces établissements volontaires semble correcte mais les bactériémies restent des infections sévères.

Mots clés : Antibiotiques ; Bactériémie ; Bon usage

1. Introduction

Bacteremia is a relatively frequent infection. The annual number of bacteremia episodes in Europe is estimated at more than 1.2 million, with an annual number of deaths ranging from 157,750 to 276,318 [1]. Bacteremia frequently presents as severe sepsis or septic shock [2], underlining the need for prompt administration of antimicrobial therapy. However, antibiotic misuse remains frequent in hospital settings, including misuse of bacteremia treatment, thus suggesting a need for better treatment strategies and for intervention of an antimicrobial management team (AMT) [3]. Furthermore, the changing microbial epidemiology over time and location, particularly demonstrated in specific populations [4,5], requires recent local data to help optimize empirical therapy. Helping managing bacteremia is also a good objective for a burgeoning antimicrobial stewardship program network as bacteremia is recognized as a severe infection and advice from specialists is often appreciated. We conducted a study of the short-term management and outcome of patients presenting with bacteremia in hospitals in a specific region of France.

2. Patients and methods

We conducted a prospective multicenter observational survey from October to November 2011. Public and private hospitals were recruited through the ARMEDA AMT network. Investigators agreed to all consecutive patients presenting with positive blood cultures during the study period, but were free to stop enrolment after 30 patients. Patients were identified by the microbiology department, and infection management was audited by the AMT of each participating hospital. Unless specified, "bacteremia" is here intended as either bacteremia or fungemia. Coagulase-negative staphylococci and other common commensal flora were considered probable contaminants and withheld from analysis (except for the mention of antibiotic treatment) if the bacterium was isolated from only a single set of blood cultures and the local AMT considered the result a contamination.

Recorded data included demographics, pathogens and susceptibility levels, probable portal of entry, acquisition origin, antibiotics used for empirical and documented therapy (including dosages, route, and administration schedule), time to first active antibiotic after blood culture, quality of medical notes, level of involvement of the AMT, and day-10 outcome. We did not record individual comorbidities (except for beta-lactam allergy) or any bacteremia severity score. Severity was only defined as the presence of severe sepsis or septic shock at bacteremia diagnosis. Patients presenting with at least one organ dysfunction, according to Bone's criteria, were classified as severe infection while patients without organ dysfunction were classified as sepsis [6].

Episodes with more than two pathogens were not recorded. Multiple episodes could be recorded per patient if the second episode occurred after the first episode treatment.

Bacteremia was classified as hospital-acquired if blood was drawn more than 48 h after admission to the hospital, as community-acquired if positive blood cultures were drawn less than 48 h after admission. Infections occurring less than 48 h after admission were classified as healthcare-associated if the patient lived in a long-term care facility, was on a home hospitalization regimen, or if the infection was catheter-related, hemodialysis-related, or if it was a febrile neutropenia episode following chemotherapy. Multidrug resistance was defined as extended-spectrum beta-lactamases or carbapenemases for Enterobacteriaceae, methicillin resistance for *Staphylococcus aureus*, glycopeptide resistance for enterococci, and ceftazidime or imipenem resistance for *Pseudomonas aeruginosa*.

For medical note evaluation, we researched the mention of positive blood cultures, an evaluation of the patient's response to treatment at 48–72 h, and a mention of the treatment strategy after receiving the drug susceptibility testing results.

The probable source of infection was determined by the physician reviewer and was based on objective clinical evidence, microbiological data, and on the physician's clinical judgment.

The empirical and documented antimicrobial treatments were analyzed in light of susceptibility results and drug diffusion. Therapy was considered adequate if patients had received at least one drug to which the bacterium/bacteria was/were susceptible, either as empirical or documented therapy, AND with known blood concentration sufficient to treat bacteremia, AND, for difficult-to-treat portals of entry/complications (i.e., meningitis, endocarditis, prosthetic joint infections, etc.) with higher doses than usually required for isolated bacteremia. We defined