

Abstract:

Objective: To analyze the distribution and drug resistance of pathogens isolated from patients with catheter-related bloodstream infection (CRBSI) in burn intensive care unit (BICU).

Methods: From January 2011 to December 2018, among 2 264 patients who were peripherally inserted central venous catheter at the BICU of the First Affiliated Hospital of Army Medical University (the third Military Medical University), hereinafter referred to as the author's unit, 159 patients were diagnosed CRBSI, including 131 males and 28 females, aged 43 (1, 79) years. The pathogens primarily isolated from peripheral venous blood and central venous catheter blood/anterior central venous catheter specimen of patients with CRBSI were retrospectively analyzed. API bacteria identification kits and automatic microorganism identification instrument were used to identify pathogens. Broth microdilution method or Kirby-Bauer paper disk diffusion method was used to detect the drug resistance of the pathogens to 5 antifungal drugs including fluconazole and itraconazole, etc., and 37 antibacterial drugs including tigecycline and imipenem, etc. Modified Hodge test was used to further identify imipenem- and meropenem-resistant *Klebsiella pneumoniae*. D test was used to detect erythromycin-induced clindamycin resistant *Staphylococcus aureus*. The WHONET 5.6 software was applied to analyze the annual incidence of CRBSI, mortality of patients with CRBSI, incidence of CRBSI cases, distribution of infection site, and duration of catheterization, detection of Gram-negative and Gram-positive bacteria, fungi, methicillin-resistant *Staphylococcus aureus* (MRSA), and methicillin-sensitive *Staphylococcus aureus* (MSSA), and drug resistance of fungi and major Gram-negative and Gram-positive bacteria to the commonly used antibiotics in clinic.

Results: (1) The incidence of CRBSI was 7.0% (159/2 264) during the eight years, which was slightly higher in 2014 and 2017 with 13.6% (30/221) and 11.1% (24/217) respectively. The mortality rate of patients with CRBSI was 7.5% (12/159). (2) The incidence of CRBSI cases was 14.9% (338/2 264); the main infection site was femoral vein, totally 271 cases (80.2%), and the duration of catheterization of this site was 9 (2, 25) d. (3) During the eight years, totally 543 strains of pathogens were isolated, including 353 (65.0%) strains of Gram-negative bacteria, 140 (25.8%) strains of Gram-positive bacteria, and 50 (9.2%) strains of fungi. The top three isolated pathogens with isolation rate from high to low were *Acinetobacter baumannii*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*, accounting for 23.2% (126/543), 17.1% (93/543), and 15.7% (85/543), respectively. Fungi were mainly *Candida parapsilosis*. Among the *Staphylococcus aureus*, the detection rate of MRSA was 98.9% (92/93), and that of MSSA was 1.1% (1/93). (4) Except for the low drug resistance rates to polymyxin B, minocycline, and tigecycline, the drug resistance rates of

Acinetobacter baumannii to the other antibiotics were considerably high (80.1%-100.0%). *Pseudomonas aeruginosa* was not resistant to polymyxin B but highly resistant to netilmicin (88.7%) and piperacillin (92.6%), with resistance rates to the other antibiotics from 34.5% to 62.7%. *Klebsiella pneumoniae* was not resistant to tigecycline and lowly resistant to imipenem and meropenem (28.9%, 9 imipenem- and meropenem-resistant strains were further confirmed by modified Hodge test), with resistance rates to the other antibiotics from 40.9% to 95.2%. The resistance rates of MRSA to most antibiotics were higher than those of MSSA. MRSA was not resistant to linezolid, vancomycin, teicoplanin, sulfamethoxazole, or tigecycline. The resistance rates of MRSA to clindamycin and erythromycin were 7.9% and 62.0%, respectively, and those to the other antibiotics were higher than 91.5%. Except for the complete resistance to penicillin G and tetracycline, MSSA was not resistant to the other antibiotics. Thirty-three strains of *Staphylococcus aureus* showed resistance to erythromycin-induced clindamycin. Fungi was not resistant to amphotericin B, with drug resistance rates to voriconazole, itraconazole, ketoconazole, and fluconazole from 4.2% to 6.2%.

Conclusions: The incidence of CRBSI and mortality of patients with CRBSI are high in BICU of the author's unit, and the main infection site is femoral vein. There are various types of pathogens in patients with CRBSI, and most of them are Gram-negative. The top three isolated pathogens are *Acinetobacter baumannii*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*, accompanying with grim drug resistance phenomenon.

Reference:

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