Antifungal Susceptibility and Species Distribution of 1,881 Candidaemia Isolates from Patients in Canadian Hospitals: CANWARD Study 2011-2016

J. Fuller1, A. Bull1, S. Shokoples1, L. Turnbull1, H. Adam2,3, M. Baxter2, D. J. Hoban2,3 and G. G. Zhane2

1 Provincial Laboratory, Alberta Health Services, University of Alberta, Edmonton, AB;
2 Medical Microbiology and Infectious Diseases, University of Manitoba, Winnipeg, MB; 3 Diagnostic Services of Manitoba, Winnipeg, MB

ABSTRACT

Background: CANWARD is a national surveillance program that characterizes pathogens causing infections in patients admitted to Canadian hospitals. The epidemiology of invasive Candida infections in Canada is not well characterized yet evidence of antifungal resistance in other countries increases. In this study, we present the species prevalence and antifungal susceptibility of candidaemia isolates recovered from hospitalized patients over a six year period.

Methods: Candida species causing bloodstream infections were collected (1 per patient) from participating hospital clinical laboratories from 2011 to 2016. Antifungal susceptibility was determined using the CLSI M27 broth microdilution method and interpretation guidelines (S4) for fluconazole (FLUC), voriconazole (VORI), caspofungin (CASP), and micafungin (MICA). Antibiotics were performed as per CLSI M07-A12 using 24 h incubation and visual endpoint determination for AMB, FLUC, VORI, CASP, and MICA. We also applied ECVs of ≤1 mg/L for AMB against all species and ≤0.5 mg/L for VORI against C. glabrata. Echinocandin resistant MICs in C. glabrata isolates were confirmed by molecular analysis of FKS loci. Molecular confirmation of azole resistant MICs was not pursued.

RESULTS

Annual participation by study sites was relatively consistent and represented 8 of the 10 provinces; 12 of the 18 sites submitted isolates for > 4 of the 6 study years. From 2011-16, annual isolate volumes were 238, 277, 347, 337, 332, and 350, respectively. The relative proportion of candidaemia patients admitted to Medicine, Critical Care, Surgical, and Emergency wards did not change over time. The male to female ratio was ~1:1 and the mean patient age was 55; patients aged 18 to 65 and >65 years represented 57% and 36% of cases, respectively.

The epidemiology of candidaemia in Canadian hospitals is informed by a limited number of publications. A recent surveillance study at two sites showed that C. albicans was the predominant cause of invasive candidaemia, followed by C. glabrata and C. parapsilosis.

Surveillance data from other countries have identified emergent resistance of Candida species to azole and echinocandin agents, most notably, C. glabrata and C. parapsilosis. The epidemiology of invasive Candida infections in Canada is not well characterized yet evidence of antifungal resistance in other countries increases. In this study, we present the species prevalence and antifungal susceptibility of candidaemia isolates recovered from hospitalized patients over a six year period.

Participating clinical microbiology laboratories collected up to ten Candida isolates per month, from January to October of each study year, from patients with incident candidaemia (1 per patient).

Demographic and hospital admission location were submitted with each isolate to a central laboratory that confirmed species identification and antifungal susceptibility.

Minimum inhibitory concentration (MIC) testing and clinical breakpoint (CBP) interpretation was performed as per CLSI M27 broth microdilution standards (A3, S4) using 24 h incubation and visual endpoint determination for AMB, FLUC, VORI, CASP, and MICA. We also applied ECVs of ≤1 mg/L for AMB against all species and ≤0.5 mg/L for VORI against C. glabrata. Echinocandin resistant MICs in C. glabrata isolates were confirmed by molecular analysis of FKS loci. Molecular confirmation of azole resistant MICs was not pursued.