Candidemia Infection: Comparison of Species Distribution and Resistance to Micafungin and Azole Antifungal Agents in Intensive Care Unit and Non-ICU Settings

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Abstract

Background: 30-50% of Candida bloodstream infections (CBI) occur in the intensive care unit (ICU). However, most data on species distribution and antifungal resistance patterns are limited to single centers, and do not compare species distribution and micafungin (MCF) or itraconazole (ITZ) resistance profiles to ICU and non-ICU settings.

Methods: We analyzed CLSI MIC data from the SENTRY Antimicrobial Surveillance Program (SARP) for 2008-2009 to compare proportions of different species, and MIC profiles of species C. albicans isolates from patients in ICU vs non-ICU locations. MIC results were obtained for MIC for Broth Dilution Antifungal Susceptibility Testing of Yeasts: third edition (CLSI) interpretive breakpoints.

Results

Organisms and study sites: Between January 2008 and December 2009, 2,196 patients with 2,557 episodes of invasive candidiasis were identified in 79 medical centers. MIC results were obtained for MCF, voriconazole (VRC), caspofungin (Caf), fluconazole (FLC), posaconazole (PSC), and itraconazole (ITZ). The species identified were Candida albicans (Ca), Candida glabrata (Cg), Candida tropicalis (Ct), Candida parapsilosis (Cp), and Candida krusei (Ck). MIC results were considered for 82% of the total episodes.

Invasive candidiasis cases occur in approximately 30 and 50% of ICU and non-ICU hospital settings. ICU isolates were among the highest of any nosocomial infection, often limited to single center studies. Similarly, only a few studies have monitored by several antifungal surveillance programs throughout the United States, Canada, Europe and Asia. In 2008-2009, the frequency of candidemia in ICU settings increased, possibly due to an increase in the proportion of candidemia cases occurring in patients with malignancies or severe immunosuppression. The majority of cases were assigned to the same three species: C. albicans, C. glabrata and C. parapsilosis. The highest proportions of Ca (50.4 vs. 47.4%) and Cg (18.1 vs 12.5%) were seen in ICU isolates compared to non-ICU isolates. European (25%), Asia-Pacific (779) and Latin America (10%) isolates were also significantly different.

In the present study, we evaluated species distribution according to ICU vs non-ICU location, and the associated resistance profiles for the contemporary echinocandins and azole antifungal agents using the SENTRY Program database for 2008-2009, in order to establish geographic variation in ICU candidemia. Additionally, we applied the recently revised Clinical and Laboratory Standards Institute (CLSI) interpretive breakpoints.

Invasive candidiasis treated at hospitals in the Asia-Pacific (16 centers, 51 episodes; 5%) and North America 2008 (442 episodes; 18%) were obtained from ICU (779) and non-ICU settings. ICU isolates from both ICU and non-ICU locations (Table 3). The isolates were identified by standard methods and stored as water suspensions in glycerol.

In conclusion, differences in both species distribution and antifungal resistance profiles were seen between ICU and non-ICU settings. There were no MCF-R strains of Cp, Ct or Ck in ICU isolates. Overall, fluconazole resistance was detected in 5.0% of ICU isolates and those from other hospital locations. MIC results for posaconazole and voriconazole were read after 48-h incubation. In all instances, the MIC values were determined visually as ≥50% inhibition of growth compared to control levels. We used the recently revised CLSI breakpoints to identify strains of C. glabrata, C. tropicalis and C. parapsilosis.

Conclusions

• Invasive candidiasis treated at hospitals in the Asia-Pacific (16 centers, 51 episodes; 5%) and North America 2008 (442 episodes; 18%) were obtained from ICU (779) and non-ICU settings. The isolates were identified by standard methods and stored as water suspensions in glycerol. In all instances, the MIC values were determined visually as ≥50% inhibition of growth compared to control levels. We used the recently revised CLSI breakpoints to identify strains of C. glabrata, C. tropicalis and C. parapsilosis.

• Differences in both species distribution and antifungal resistance profiles were seen between ICU and non-ICU settings. There were no MCF-R strains of Cp, Ct or Ck in ICU isolates. Overall, fluconazole resistance was detected in 5.0% of ICU isolates and those from other hospital locations. MIC results for posaconazole and voriconazole were read after 48-h incubation. In all instances, the MIC values were determined visually as ≥50% inhibition of growth compared to control levels. We used the recently revised CLSI breakpoints to identify strains of C. glabrata, C. tropicalis and C. parapsilosis.

• Overall, fluconazole resistance was seen in 5.0% of ICU isolates and 4.3% of non-ICU isolates of C. parapsilosis, whereas cross-resistance among the three species is low. MIC results for posaconazole and voriconazole were read after 48-h incubation. In all instances, the MIC values were determined visually as ≥50% inhibition of growth compared to control levels. We used the recently revised CLSI breakpoints to identify strains of C. glabrata, C. tropicalis and C. parapsilosis.

• The only species found for which resistance to both azoles and echinocandins was reported for ICU isolates and those from other hospital locations. MIC results for posaconazole and voriconazole were read after 48-h incubation. In all instances, the MIC values were determined visually as ≥50% inhibition of growth compared to control levels. We used the recently revised CLSI breakpoints to identify strains of C. glabrata, C. tropicalis and C. parapsilosis.

References


