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Antifungal susceptibility

Three-year analysis of susceptibilities of yeast species to fluconazole and voriconazole by disk diffusion testing from China hospital invasive fungal surveillance net (CHIF-NET) 2010-2012

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Objectives.

In order to monitor changing trends in the species distribution and antifungal susceptibility patterns of invasive yeast isolates to guide clinical work, we undertook a sentinel surveillance program: China Hospital Invasive Fungal Surveillance Net (CHIF-NET) from August 2009. Here we give a brief report of the first three years results of CHIF-NET.

Methods.

Twenty-six tertiary hospitals from 14 provinces in China participated in CHIF-NET. 3676 yeast isolates from blood, sterile body fluids, tissue, etc were collected and tested from 2010 through 2012. Molecular methods including sequencing and MALDI-TOF-MS were used for species identification, and susceptibility to fluconazole and voriconazole was determined by the CLSI M44-A2 disk diffusion method but using species-specific clinical breakpoints or epidemiological cutoff value.

Results.

Candida spp. made up 91.4% of all 3676 yeast isolates, followed by *Cryptococcus* spp. (6.9%) and other non-*Candida* yeast spp. strains (1.7%). A total of 51 different species of Yeast were isolated. The commonest five yeast species isolated were *Candida albicans* (Cal, 41.9%), *C. parapsilosis* sensu stricto (Cpa, 13.8%), *C. tropicalis* (Ctr, 16.6%), *C. glabrata* sensu stricto (Cgl, 10.4%) and *Cryptococcus neoformans* (Cne, 6.8%). Although these five species were prominent in most geographic regions in the study, the frequency and rank order varied considerably across different hospitals.

Both fluconazole (F) and voriconazole (V) showed good antifungal activity to Cal (S% to F: 99.4; S% to V: 99.5), Cpa (S% to F: 94.7; S% to V: 96.6), Ctr (S% to F: 93.4; S% to V: 94.1) and Cne (S% to F: 91.6; S% to V: 99.6). Relative higher resistant rates were detected in Cgl (R% to F: 13.4; non-WT% to V: 14.1), and obvious cross-resistant to both two azoles was found. Reduced susceptibility to fluconazole and voriconazole were observed amongst less common yeast species e.g., *C. pelliculosa*, *C. lipolytica*, *C. quercitrusa* and *Rhodo. mucilaginosa*.

There was no consistent trend toward increasing resistance to fluconazole and voriconazole detected to common species Cal and Cne over the three-year time period, however, a little bit increasing trend were observed among Cpa, Ctr and Cgl. The study has made other significant academic contributions of global significance, including: important epidemiological lessons with the geographical diversity of yeast species as well as the description of a novel yeast pathogen, *Candida quercitrusa*, which was shown to cause human invasive disease. A rare drug-resistant *C. tropicalis* outbreak was also described in a hospital intensive care unit. A first case report of in vivo development of azole resistance in *C. parapsilosis*.

Conclusions.

The CHIF-NET results provided high-quality, accurate and first-hand data for the prevalent yeast pathogens causing serious infections and antifungal susceptibilities in China. It could be used as basis for comparison for future studies, and also serve for guidance of clinical antifungal therapy choices. In recent years, CHIF-NET has continued to evolve into a larger network. Presently, it appears that the network is approaching 100 hospital laboratories for future CHIF-NET studies.