Emerging multidrug-resistant *Candida duobushaemulonii* infections in Panama hospitals: importance of laboratory surveillance and accurate identification

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INTRODUCTION

- Candida duobushaemulonii* is a yeast that belongs to the *C. haemulonii* species complex along with *C. haemulonii* and *C. haemulonii* var. *vulnera*.
- It is closely related to *C. auris*, which is multidrug-resistant (MDR) and can cause outbreaks in the healthcare setting.
- Little is known about species in the *C. haemulonii* complex because infections are rare.
 - C. haemulonii* infections have involved skin wounds in patients with diabetes or peripheral vascular disease.
 - C. duobushaemulonii* has been documented to cause vulvovaginal candidiasis and chronic lower extremity wound infections.
 - However, bloodstream infections with these organisms is thought to be rare.

METHODS

Given the emergence of *C. auris*, the Panamanian Ministry of Health implemented laboratory surveillance for *C. auris* in October 2016.

- Suspected *C. auris* isolates were forwarded to the Panamanian national reference laboratory.
 - Suspected *C. auris* included isolates identified as *Candida haemulonii*, *Candida famata*, or *Candida* spp. by VITEK 2®.
- Definitive identification was made with MALDI-TOF and D1/D2 sequencing.
- Antifungal susceptibility testing (AFST) was conducted by VITEK 2® for all isolates, and four isolates underwent AFST by broth microdilution and Etest®, which are the reference methods.

RESULTS

During November 2016–May 2017, the national microbiology reference laboratory at Instituto Conmemorativo Gorgas de Estudios de la Salud (ICGES), Panama City, Panama, received 36 isolates suspected to be *C. auris* from 31 patients (All were initially identified as *C. haemulonii*).

Figure 1. Flow chart of suspected *C. auris* isolates

*Others: skin and nails (n=5), vaginal discharge (n=1)

CONCLUSIONS

- We documented the presence of invasive infections by *C. duobushaemulonii*, a multidrug-resistant *Candida* species in Panama.
- Most *C. duobushaemulonii* isolates were cultured from the bloodstream establishing it as a cause of invasive infections. In fact, a majority of bloodstream isolates suspected of being *C. auris* were actually *C. duobushaemulonii*.
- Clinicians, microbiologists, and laboratory technicians should pay special attention to uncommon or unidentified fungal species identified by automated tests. Confirmatory testing with MALDI-TOF or DNA sequencing is recommended for these pathogens.
- Integrated epidemiologic and laboratory surveillance is a fundamental component of global health security and necessary for the detection and control of such emerging pathogens.

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Patients

14 patients with *C. duobushaemulonii* infection:

- Nine (64%) patients were male.
- Mean age was 47 years (range: 0–77); three cases among children (two were 2 years old and one was <30 days old).
- Patients were treated in six hospitals from four geographical regions of Panama (Figure 1A); half were from one hospital in Panama City.
- More than half of patients were identified in the last two months of 2016 (Figure 1B).

Figure 1. Confirmed isolates of the emerging pathogen *C. duobushaemulonii* in Panama, November 2016–May 2017.

AFST results by VITEK 2®

Table 1. Antifungal susceptibility results by VITEK 2® of <i>C. duobushaemulonii</i> isolates from Panama, 2016-2017 (n=17)					
	FCZ	VCZ	CSF	MCF	AmpB
MIC ₅₀	32 µg/mL	1 µg/mL	0.25 µg/mL	0.125 µg/mL	>16 µg/mL
MIC ₉₀	>64 µg/mL	>8 µg/mL	0.25 µg/mL	0.25 µg/mL	>16 µg/mL
Testing performed by by VITEK 2® automated system. (FCZ) fluconazole, (VCZ) voriconazole, (CSF) caspofungin, (MCF) micafungin (AmpB) amphotericin B					

AFST test by VITEK 2® revealed elevated MICs for fluconazole (≥32 µg/mL; n=11; 65%), voriconazole (≥4 µg/mL; n=8; 47%) and amphotericin B (≥2 µg/mL; n=14; 82%).

AFST conducted at CDC for four isolates using broth microdilution and E test:

- All had MICs for fluconazole of ≥32 µg/mL by VITEK 2®, two had fluconazole MICs below the breakpoint (4 and 8 µg/mL) by broth microdilution.
- Results for amphotericin B showed consistently high MICs, all >8 µg/mL by both VITEK 2® and Etest®.
- Although individual MIC values for micafungin varied slightly between AFST methodologies, the interpretation of susceptible remained regardless of method used.

Limitations

- We did not have clinical information on the patients, including, clinical conditions, treatments, and outcomes.
- We were unable to perform AFST by the reference methodology in 13 of 17.