# Impact of Candida species colonization and azoles resistance in a neonatal intensive care unit

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## INTRODUCTION AND PURPOSE

Candida species are among the top 10 most frequently isolated nosocomial bloodstream pathogens in Europe. In particular, in neonatal intensive care units (NICUs) Candida infections are an emerging concern because of the increasing incidence, the related high morbidity and mortality rates reported. Moreover, the epidemiology of Candida infection rapidly changed in these years leading to the selection of less sensitive strains and species. Surveillance studies are mandatory to identify the local distribution of species, their antifungal susceptibility profiles and the emergence of resistance strains.

## METHODS

From December 2012 we performed a cohort prospective surveillance study on Candida colonization in our NICU, collecting weekly nasal and rectal swabs. Swabs were placed on Sabouraud agar. Candida growth on agar plates was confirmed by microscopic observation. Furthermore, Candida spp. was identified through Candida chromogenic agar (Candida chromogenic agar, Laboratorios Conda) and API® 20C AUX (Biomérieux). The first isolated non-C.albicans Candida (NCAC) species from colonized patients were tested with the main antifungal agents (YeastOne® Y010 Thermo Fisher Scientific) and the obtained MIC values were read according to CLSI..

## RESULTS

From December 2012 to June 2016 we enrolled 874 neonates and analyzed respectively 2014 nasal and rectal swabs. 20/2014 (0,99%) of nasal swabs and 128/2014 (6,35%) of rectal swabs tested positive for *Candida* spp. The species distribution is showed in the Graph 1. 89/874 (10,18%) neonates tested positive at least in one swab. 59 isolates of NCAC species were tested with the main antifungal agents. All the tested strains were susceptible to echinocandins and amphotericin B. The susceptibility patterns for azoles are shown in the Table 1.

**Graph 1: Species distribution in nasal and rectal swabs**

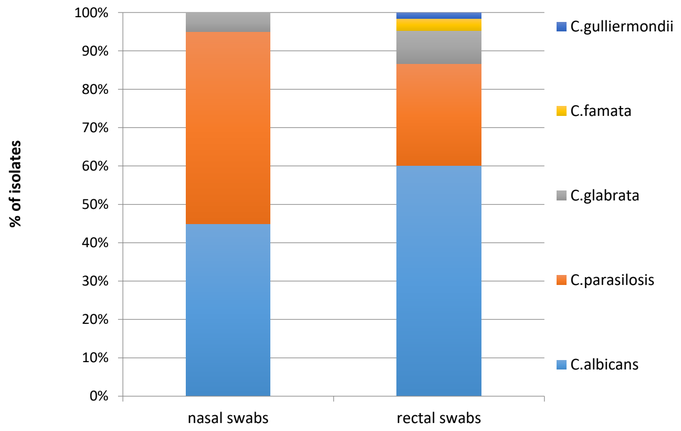


**Table 1: Azoles susceptibility patterns**

| Candida (C.) species | PZ MIC | PZ CBPs | PZ ECVs | VOR MIC | VOR CBPs | VOR ECVs | IZ MIC | IZ CBPs | IZ ECVs | FZ MIC | FZ CBPs | FZ ECVs | N° isolates |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C.famata | ≤0,008 | S | N.I. | 0,03 | S | N.I. | 0,03 | S | N.I. | 2 | S | N.I. | 3/3 |
| | 1 | N.I. | WT | 1 | S | WT | 0,5 | DDS | WT | 32 | DDS | WT | 5/11 |
| | 0,25 | N.I. | WT | 0,25 | S | WT | 0,12 | S | WT | 16 | DDS | WT | 1/11 |
| | 1 | N.I. | WT | 1 | S | WT | 2 | R | WT | 32 | DDS | WT | 4/11 |
| C.glabrata | >8 | N.I. | noWT | >8 | R | noWT | >16 | R | noWT | 258 | R | noWT | 1/11 |
| | ≤0,008 | S | N.I. | 0,06 | S | WT | ≤0,015 | S | N.I. | 4 | S | WT | 1/4 |
| | 0,25 | N.I. | N.I. | 0,5 | S | noWT | 0,5 | DDS | N.I. | 16 | DDS | noWT | 1/4 |
| | 0,5 | N.I. | N.I. | 2 | DDS | noWT | 1 | R | N.I. | 64 | R | noWT | 1/4 |
| C. guilliermondii | 1 | N.I. | N.I. | 4 | DDS | noWT | 8 | R | N.I. | 64 | R | noWT | 1/4 |
| | 0,015 | N.I. | WT | 0,06 | S | WT | 0,03 | S | WT | 2 | S | WT | 30/41 |
| | ≤0,008 | S | WT | 0,06 | S | WT | ≤0,015 | S | WT | 4 | DDS | noWT | 6/41 |
| | 0,015 | N.I. | WT | 0,06 | S | WT | 0,03 | S | WT | 64 | R | noWT | 2/41 |
| | 0,5 | N.I. | WT | 0,5 | S | noWT | 0,5 | DDS | noWT | 16 | R | noWT | 1/41 |
| C.parapsilosis | 2 | N.I. | noWT | >1 | R | noWT | >1 | R | noWT | >32 | R | noWT | 2/41 |

PZ=posaconazole, VOR=voriconazole, IZ=itraconazole, FZ= fluconazole, CBPs= clnical break-points, ECVs= epidemiological cutoff values
N.I.= no interpretation available, S= susceptible, DDS= dose dipendent suscestible, R= resistant, WT= wild type, noWT=no wild type

## CONCLUSIONS

Our study confirm the rule of surveillance in the prevention and control of Candida spp. healthcare related infections especially in an high risk ward such as NICU. In particular, in our NICU fluconazole prophylaxis is administered according to standard protocols from 2009. Antifungal susceptibility testes allowed to identify resistant and mutant strains whom acquired resistance so to obtain both clinical and epidemiological data promptly.

**REFERENCES:**
**CLSI M27-S4Reference Method for Broth Dilution Antifungal Susceptibility Testing of Yeasts; Fourth Informational Supplement**
**Pfaller, M. A., et al. "Multicenter study of anidulafungin and micafungin MIC distributions and epidemiological cutoff values for eight Candida species and the CLSI M27-A3 broth microdilution method." Antimicrobial agents and chemotherapy 58.2 (2014): 916-922.**