

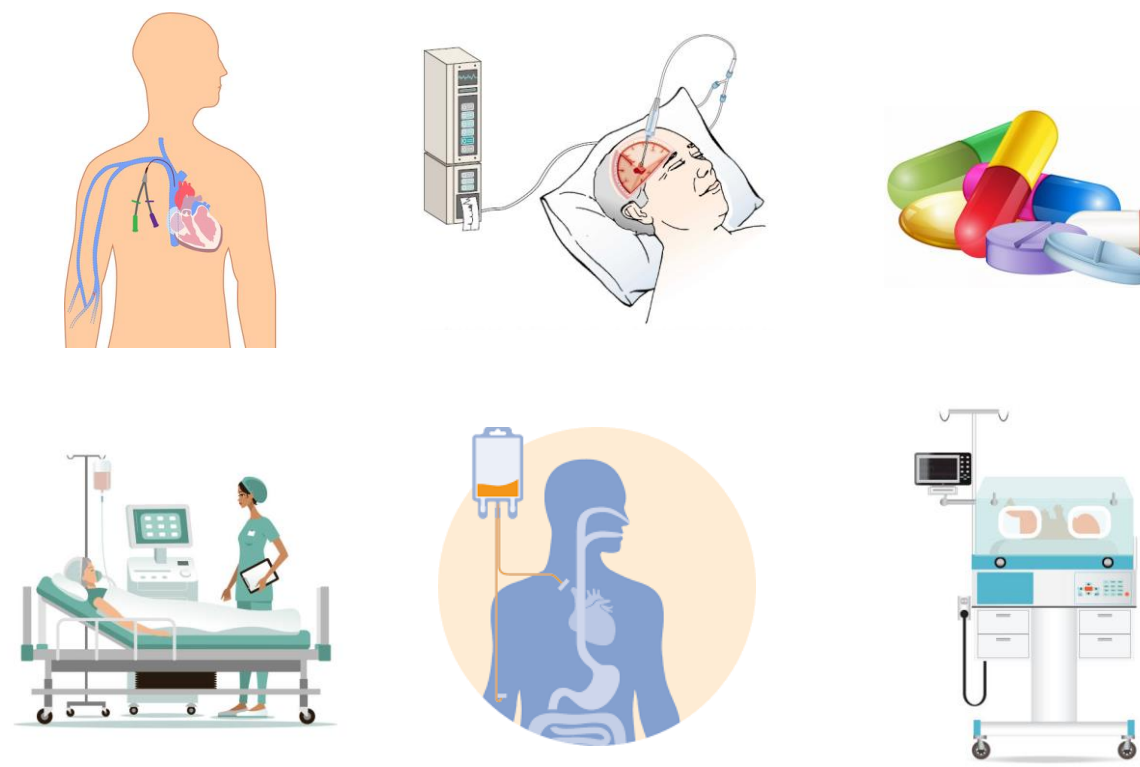
# Invasive infections by non-*albicans* *Candida* in a fourth level hospital in Colombia: an approach to their epidemiology and antifungal susceptibility

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## Introduction

- The increase in immunocompromised patients or with other risk factors has led to an increase in **invasive fungal infections** associated with health care, with significant morbidity and mortality rates.
- These infections may be caused by **non-*albicans* *Candida* species**, which may have natural or acquired resistance to various antifungals.
- Risk factors:
  - Central venous catheters
  - Intravascular or intracranial devices
  - Long-term use of broad-spectrum antibiotics
  - Long stays in hospital and ICU
  - Parenteral nutrition
  - Improved survival of premature babies
- Aim:** to study the epidemiology of invasive infections caused by non-*albicans* *Candida* species in a fourth level hospital in Bogota, Colombia, and to determine the antifungal susceptibility profile of the etiological agents.



## Methodology

**Population:** non-*albicans* *Candida* isolates recovered from invasive infection for 18 months and identified by MALDI-TOF in a fourth level hospital in Bogota, Colombia.

**Patients' variables:** Age and sex, underlying diseases or risk factors, length of hospital stay and outcome, clinical sample and *Candida* species.

**Antifungal susceptibility testing:** Sensititre® YeastOne® plates to anidulafungin (AND), micafungin (MF), caspofungin (CAS), flucytosine (FC), posaconazole (PZ), voriconazole (VOR), itraconazole (IZ), fluconazole (FZ) and amphotericin B (AB), were used (Fig. 1). *Candida parapsilosis* ATCC22019 and *Candida krusei* ATCC6258 were used as controls.

**ITS sequencing:** following the ISHAM barcoding scheme, with the primers SR6R and LR1, PCR products were sequenced by GenCore, Universidad de los Andes, Bogota, Colombia. A dendrogram was constructed using maximum likelihood analysis with a bootstrap analysis of 100 replicates with MEGA11 (Fig. 1).

**Ethics:** Méderi Technical Research Committee, protocol B-024-2021, and Research Ethics Committee of Universidad del Rosario, protocol DVO005 1808-CV1488.

## Results and discussion

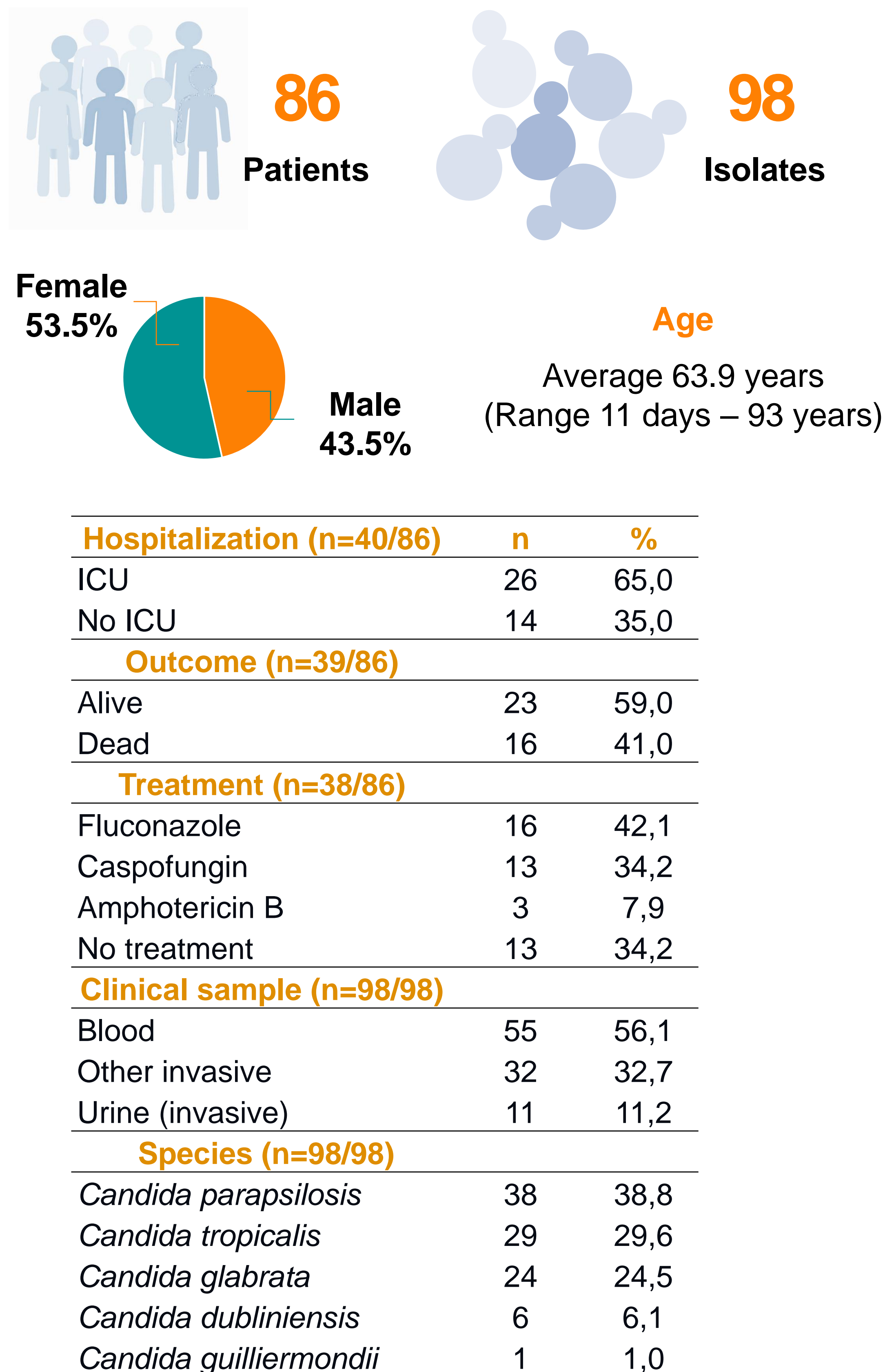


Table 1. Clinical characteristic of patients and isolates

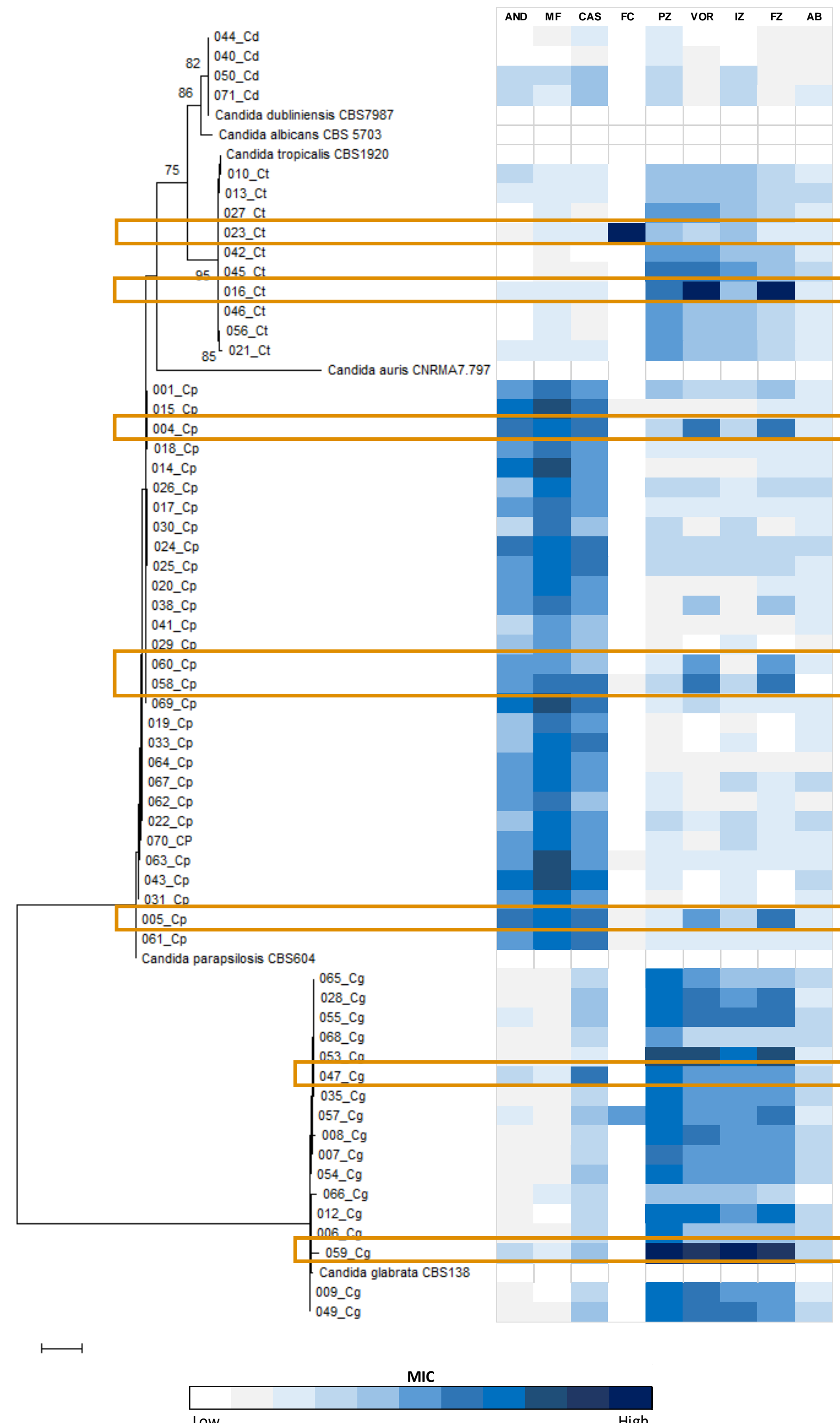


Figure 1. Dendrogram showing the genetic relationship and the antifungal susceptibility (AST) of 60 non-*albicans* *Candida* isolates. The tree is based in ITS sequencing. AST is shown in front of each isolate.

- non-*albicans* *Candida* species caused 49% of cases of candidemia and candidiasis in the studied hospital.
- C. parapsilosis* predominates among non-*albicans* *Candida* species causing mainly **bloodstream infections**, especially in patients **older than 60 years** (Table 1).
- The **mortality** rate from these infections is significant (41%), being higher in patients infected by *C. glabrata* (89%).
- The identification of atypical species is of utmost importance, since these species may present **resistance** or decreased susceptibility to azoles. In our study, four *C. parapsilosis* isolates were fluconazole resistant, one *C. tropicalis* isolate was resistant to both fluconazole and voriconazole and one isolate of *C. glabrata* was resistant to all azoles (Fig 1).
- An isolate of *C. glabrata* was resistant to caspofungin, one of the first-line drugs for the treatment of candidemia and candidiasis (Fig 1).
- In general, *C. parapsilosis* was found to be less susceptible to echinocandins, while *C. glabrata* and *C. tropicalis* were less susceptible to azoles.
- Susceptibility to amphotericin B and flucytosine did not differ between species, although one isolate of *C. tropicalis* was resistant to flucytosine.
- C. dubliniensis* isolates were susceptible to all antifungal tested.

**CONCLUSIONS:** In the studied hospital, *C. parapsilosis* predominates among non-*albicans* *Candida* species causing mainly bloodstream infections, especially in patients older than 60 years, with significant mortality. In addition, less common species, such as *C. dubliniensis* and *C. guilliermondii*, were also reported causing invasive infection. This study contributes epidemiological data to the surveillance of non-*albicans* *Candida* species in Colombia and globally. This is very important considering the increase in immunocompromised patients or with other risk factors, who are more predisposed to develop an invasive fungal infection, specially associated with health care. Our study also shows that the therapeutic strategies used to treat these infections are not always adequate to contribute to better outcomes, since there are resistant isolates or with decreased susceptibility to certain antifungals, which could significantly increase morbidity and mortality rates.

## References

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## Acknowledgments

To **Centro de Investigaciones de Méderi** - CIMED, grant number B-024-2021, for funding this project. To **GenCore** from Universidad de los Andes for generating and subsidizing part of the sequencing results.