

# THE LANCET Microbe

## Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Salmanton-García J, Hoenigl M, Gangneux J-P, et al. The current state of laboratory mycology and access to antifungal treatment in Europe: a European Confederation of Medical Mycology survey. *Lancet Microbe* 2022; published online Dec 1. [https://doi.org/10.1016/S2666-5247\(22\)00261-0](https://doi.org/10.1016/S2666-5247(22)00261-0).

# The current state of laboratory mycology and access to antifungal treatment in Europe: A European Confederation of Medical Mycology survey

## Supplementary tables

**Supplementary table 1.** Survey answered by participating institutions.

<b>1. Institution Profile</b>
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- 1.1. Your position
  - 1.1.1. Attending Physician
  - 1.1.2. Attending Physician - Infectious Diseases Specialist
  - 1.1.3. Clinical microbiologist
  - 1.1.4. Director
  - 1.1.5. Infection Control Practitioner
  - 1.1.6. Laboratory Professional
  - 1.1.7. Professor
  - 1.1.8. Other
  
- 1.2. Contact information
  - 1.2.1. Your name
  - 1.2.2. Your e-mail address
  
- 1.3. Institution
  - 1.3.1. Institute
  - 1.3.2. Department
  
- 1.4. Location of your institution
  - 1.4.1. City
  - 1.4.2. Region/State
  - 1.4.3. Country
  
- 1.5. Institution profile
  - 1.5.1. Day-Hospital
  - 1.5.2. Dialysis Clinic
  - 1.5.3. Federal Institute / Research Hospital
  - 1.5.4. Oncology Clinic
  - 1.5.5. Private Hospital
  - 1.5.6. Private Laboratory
  - 1.5.7. Public Hospital
  - 1.5.8. University Hospital
  - 1.5.9. Other. Please, specify:
  
- 1.6. Institution size - number of beds
  - 1.6.1. Overall
  - 1.6.2. Adult intensive care beds
  - 1.6.3. Paediatric/Neonatal intensive care beds
  
- 1.7. Does your institution take care of patients with any of the following conditions? *Please answer each question with yes, no or unknown.*
  - 1.7.1. COVID-19
  - 1.7.2. Diabetes mellitus

- 1.7.3. Hematology
- 1.7.4. HIV/AIDS
- 1.7.5. Neonatal Intensive Care Unit
- 1.7.6. Oncology
- 1.7.7. Parenteral nutrition
- 1.7.8. Solid organ transplantation
- 1.7.9. Stem cell transplantation
- 1.8. Does your institution have a microbiology laboratory?
  - 1.8.1. Yes, in place
  - 1.8.2. Yes, outsourcing laboratory services
  - 1.8.3. No
- 1.9. Where is diagnostic mycological procedure performed?
  - 1.9.1. Always in our institution
  - 1.9.2. Part in our institution / part outsourced
  - 1.9.3. Totally outsourced
  - 1.9.4. We do not have access to mycological diagnostic tools

<b>2. Perceptions on invasive fungal disease in your institution</b>
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- 2.1. Please rate the incidence of invasive fungal infections in your institution from very low (1) to very high (5)
- 2.2. Please rate the incidence of mucormycosis in your institution from very low (1) to very high (5)
- 2.3. Pathogens of highest importance
  - 2.3.1. *Aspergillus* spp.
  - 2.3.2. *Candida* spp.
  - 2.3.3. *Cryptococcus* spp.
  - 2.3.4. *Fusarium* spp.
  - 2.3.5. *Histoplasma* spp.
  - 2.3.6. Mucorales
- 2.4. What is the approximate number of samples (per month) processed in your mycology laboratory?
  - 2.4.1. TOTAL number of samples
  - 2.4.2. BLOOD samples
  - 2.4.3. BAL (bronchoalveolar lavage) samples
  - 2.4.4. TISSUE (from biopsies) samples
  - 2.4.5. URINE samples
- 2.5. Please indicate all available drugs for antifungal treatment in your institution. *Please answer each question with yes, no or unknown.*
  - 2.5.1. Amphotericin B deoxycholate
  - 2.5.2. Amphotericin B lipid complex
  - 2.5.3. Amphotericin B liposomal
  - 2.5.4. Amphotericin B - other formulations
  - 2.5.5. Anidulafungin
  - 2.5.6. Caspofungin
  - 2.5.7. Fluconazole
  - 2.5.8. Flucytosine (5-FC)
  - 2.5.9. Isavuconazole
  - 2.5.10. Itraconazole
  - 2.5.11. Micafungin
  - 2.5.12. Posaconazole
  - 2.5.13. Terbinafine

### 3. Microscopy

- 3.1. Which methodologies are used in fungal microscopy? *Please answer each question with yes, no or unknown.*
- 3.1.1. Calcofluor white
  - 3.1.2. Giemsa stain
  - 3.1.3. China/India ink
  - 3.1.4. Potassium hydroxide
  - 3.1.5. Silver stain
  - 3.1.6. Others
- 3.2. How frequently is microscopy performed when a fungal disease is suspected from never (1) to always (5)? (e.g., in sterile clinical samples or BAL)
- 3.3. Do you have access to fluorescence dyes?
- 3.4. When cryptococcosis is suspected is direct examination in body fluids available?
- 3.4.1. Yes, India ink
  - 3.4.2. Yes, other stains
  - 3.4.3. No
- 3.5. When pneumocystosis is suspected is silver stain performed?
- 3.5.1. Yes
  - 3.5.2. No
- 3.6. When mucormycosis is suspected, is direct microscopy with optical brighteners performed?
- 3.6.1. Yes
  - 3.6.2. No

### 4. Culture and Fungal Identification

- 4.1. Are automated blood cultures available in case of fungemia suspicion?
- 4.1.1. Yes
  - 4.1.2. No
- 4.2. Please mark all methods used for fungal cultures. *Please answer each question with yes, no or unknown.*
- 4.2.1. Niger seed agar (Bridseed agar)
  - 4.2.2. Candida Chromogenic mediaogen
  - 4.2.3. Lactrimel Agar
  - 4.2.4. Potato Dextrose Agar
  - 4.2.5. Sabouraud
  - 4.2.6. Sabouraud + Chloramphenicol
  - 4.2.7. Sabouraud + Gentamicin
  - 4.2.8. Selective agar (Chloramphenicol + Cycloheximide)
  - 4.2.9. Others
- 4.3. Please select all available test for species identification. *Please answer each question with yes, no or unknown.*
- 4.3.1. Automated identification (i.e., VITEK, other commercial tests)
  - 4.3.2. Biochemical tests (classic mycology)
  - 4.3.3. DNA sequencing
  - 4.3.4. MALDI – TOF – MS

#### 4.3.5. Mounting medium

#### 4.4. Do you have access to antifungal susceptibility tests?

- 4.4.1. For yeasts
- 4.4.2. For moulds
- 4.4.3. For both
- 4.4.4. None

#### 4.5. Which of the following technologies for susceptibility testing are available? *Please answer each question with yes, no or unknown.*

- 4.5.1. Broth microdilution, using CLSI standards
- 4.5.2. Broth microdilution, using EUCAST standards
- 4.5.3. Gradient strip tests
- 4.5.4. VITEK<sup>®</sup>

#### 4.6. Please choose the answer that best matches the maximum identification capability (of yeasts) in your laboratory

- 4.6.1. Genus
- 4.6.2. Genus / species

#### 4.7. Please choose the answer that best matches the maximum identification capability (of moulds) in your laboratory

- 4.7.1. Genus
- 4.7.2. Genus / species

### **5. Serology**

#### 5.1. Which of the following serology tests (antibody detection) are available? *Please answer each question with yes, only at an outsourced laboratory, no or unknown.*

- 5.1.1. *Aspergillus* spp.
- 5.1.2. *Candida* spp.
- 5.1.3. *Histoplasma* spp.
- 5.1.4. *Paracoccidioides* spp.

### **6. Antigen Detection**

#### 6.1. Which of the following antigen detection tests are available? *Please answer each question with yes, only at an outsourced laboratory, no or unknown.*

- 6.1.1. *Aspergillus* (lateral flow device)
- 6.1.2. *Aspergillus* galactomannan (immunoenzymatic sandwich microplate assay)
- 6.1.3. *Aspergillus* galactomannan (lateral flow assay)
- 6.1.4. *Candida* antigen
- 6.1.5. *Cryptococcus* (lateral flow assay)
- 6.1.6. *Cryptococcus* (latex agglutination test)
- 6.1.7. *Histoplasma*
- 6.1.8. Beta-d-glucan

### **7. Molecular Tests**

#### 7.1. Which of the following molecular tests are available? *Please answer each question with yes, only at an outsourced laboratory, no or unknown.*

- 7.1.1. *Aspergillus* PCR
- 7.1.2. *Candida* PCR
- 7.1.3. *Pneumocystis* PCR
- 7.1.4. Mucorales PCR
- 7.1.5. Other molecular tests

## **8. Therapeutic Drug Monitoring (TDM)**

8.1. Does your institution have access to therapeutic drug monitoring of antifungal agents?

*Please answer each question with yes, only at an outsourced laboratory, no or unknown.*

- 8.1.1. 5-flucytosine
- 8.1.2. Itraconazole
- 8.1.3. Posaconazole
- 8.1.4. Voriconazole

**Supplementary table 2.** ECMM Excellence Centres quality audit.

<p><b>Blue Status</b> (laboratory or clinical)</p>	<p>The minimum requirements for the <b>laboratories</b> consist of:</p> <ul style="list-style-type: none"> <li>• Identification of medically important yeasts and moulds</li> <li>• Susceptibility testing on yeasts and moulds according to standard procedures</li> <li>• Performance of ELISA or equivalent assay for <i>Aspergillus</i> antigen</li> <li>• Cryptococcal antigen test</li> </ul> <hr/> <p>The <b>clinical</b> minimum requirements for the Blue Status in part depend on the type of patients cared for:</p> <ul style="list-style-type: none"> <li>• Timely CT scan in immunocompromised patients with suspected pneumonia</li> <li>• Timely CT or MRI scan in immunocompromised patients with suspected brain infection</li> <li>• Timely bronchoscopy and BAL</li> <li>• Access to azoles, amphotericin B, and an echinocandin</li> <li>• Access to appropriate surgery</li> <li>• Access to second level ICU</li> </ul>
<p><b>Silver Status</b> (laboratory or clinical)</p>	<ul style="list-style-type: none"> <li>• 2/3 of the practice recommendations according to the audit plan should be implemented (<a href="https://www.ecmm.info/wp-content/uploads/ECMM-Excellence-Centers-Clinical-Quality-Audit.pdf">https://www.ecmm.info/wp-content/uploads/ECMM-Excellence-Centers-Clinical-Quality-Audit.pdf</a> and <a href="https://www.ecmm.info/wp-content/uploads/ECMM_EXCELLENCE_flyer-2018.pdf">https://www.ecmm.info/wp-content/uploads/ECMM_EXCELLENCE_flyer-2018.pdf</a>)</li> </ul>
<p><b>Gold Status</b> (laboratory and clinical)</p>	<ul style="list-style-type: none"> <li>• Excellence in the both, laboratory mycology and clinical mycology.</li> </ul>
<p><b>Diamond Status</b> (laboratory and clinical)</p>	<ul style="list-style-type: none"> <li>• Gold Status AND participation in ECMM endorsed clinical or epidemiological studies</li> </ul>