Study Protocol for European Confederation of Medical Mycology (ECMM) Multicenter Telemycology (remote digital image reading) Project.



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Background: Conventional diagnostic techniques for fungal infections, including microscopy and culture methods, are resource-intensive and necessitate highly trained personnel, which are often lacking in regions with limited medical infrastructure. This scarcity leads to underdiagnosis and delayed treatment of fungal infections which directly affect the mortality rates. Furthermore, there is a global shortage of specialized laboratory personnel in the field of mycology, emphasizing the critical need for remote diagnostic services.

Telemedicine (remote medical diagnosis) has become a significant part of daily medical practice, particularly in diagnostic fields such as pathology and radiology. While automated clinical bacteriology laboratories have seen advancements in this area, remote digital reading and diagnosis are still far from being widespread in clinical mycology. This is particularly important given the severe shortage of trained personnel and the high demand in this field.

Aim: This study explores remote digital plate reading and microscopy in fungal diagnostics, aiming to digitize the clinical mycology workflow. Digital imaging could significantly improve the speed and accuracy of diagnosing fungal infections, crucial for managing their rising incidence and reducing mortality. Additionally, developing these digital tools can enhance collaboration between clinical mycology laboratories strengthening global diagnostic capabilities and improv training and education at individual laboratory level.

Study protocol:

A. Work Package 1 (WP1). Configuration of the library:

   The image library will be collected in Clinical Microbiology at Karolinska Institutet, Division of Laboratory Medicine, Stockholm, Sweden. All images will be distributed in three main groups. These groups will be arranged as;

1. Macroscopic images of Candida Species on Chrom agar (≈30 images)
2. Macroscopic and microscopic images of various Mold species (≈ 60 images)
3. Direct microscopy slide images from clinical samples (≈ 100 images)

A. Work Package 2 (WP2). Evaluation of the images by participants

Every participant from the laboratories that involve the study will allocate 3-5 microbiologists and evaluate the images in the given time. The images will be presented to the attendees in random order in an image bank, and the attendees will choice the appropriate answer according to the choices that are already adjusted under the image. Each participant in the study will be asked to complete a short survey to understand their experience and background in mycology field.

B. Work Package 3 (WP3). Data analyses

All the data that are collected from separate laboratories will be evaluated by study group leader. The data will be deciphered according to the image groups, the background of the participants, the accuracy of the results by comparison with the definitive diagnosis.

C. Work Package 4 (WP4) Scientific dissemination and assessment

The results of the study will be presented and shared with the participant laboratories anonymously in remote study meetings. The outcome of the study will be presented in an European Congress (ECCMID or TIMM) according to the timeline. The material will later be published as a multi-center study by the participants.

Timeline:

WP/ months	June 24	July 24	August 24	Sept 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25	March 25
WP1										
WP2										
WP3										
WP4										