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## Microbiologic assessment of indoor air quality in hospitals

Graça, Joana (1, 2); Pinto, Cláudia (3); Lopes, Ariana (4); Gonçalves, Sérgio (4); Santos, Isabel (3); Nicolau, Ana (1); Lima, Néilson (3)

1: IBB-Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Portugal;

2: Biotempo – Consultoria em Biotecnologia, Lda., Portugal;

3: Micoteca da Universidade do Minho, IBB-Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Portugal;

4: Centro Hospitalar do Alto Minho, Portugal

E-mail: joanaccg@iol.pt

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### Abstract

Air quality in hospital environment has become an important issue in modern society and its assessment appears to be a fundamental tool on diseases diagnostic and prevention. The most common airborne microorganisms include bacteria and fungi species, which are responsible for multiple health affections like allergies and respiratory diseases.

Throughout one year, a study was developed in order to quantify the bacterial and fungal load present in the indoor air samples collected on different facilities within three Portuguese hospitals of medium to large dimension in the North of Portugal. With this research we aim to provide helpful information relatively to the identification and prevention of hospital associated biologic risks and consequently to define and implement an appropriate overall methodology to its control.

Air samples were collected twice monthly in each of the hospitals over a period of eleven months, using a Merck MAS-100 air sampler and 90 mm Petri dishes containing Dichloran Rose Bengal Chloranphenicol Agar (DRBC) and Chocolate-Polyvitex Agar to collect viable fungi and bacteria particles, respectively. A volume of 100 L were collected in neonatology and intensive care unit, whereas samples of 50 L were collected in the internal medicine, the emergency room and the main entrance hall, as well as in the outside. All the samples were taken in duplicate. The plates were incubated 3-5 days at 25 °C for fungi particles and 2 days at 37 °C for bacteria particles, after which colony forming units (CFU) were counted and identified.

Despite of all the differences between the hospitals (location, size, services and facilities) the results have shown a prevailing presence of *Cladosporium*, *Penicillium*, *Aspergillus* and *Staphylococcus* species. Also, the lower bioload levels were finding in more confined areas within the hospital, like neonatology and intensive care unit. On the remaining facilities more than 80% of the samples revealed contamination levels higher than the maximum reference level of 500 CFU/m<sup>3</sup> imposed by Portuguese legislation on D.L. 79/2006, 4th April. Inclusively, inner contamination revealed to be higher than in the outside which suggests the existence of dissemination agents on the inside of the buildings.

This study represents a contribution on the assessment of the main biological risks inherent to exposure of patients and hospital workers and is fundamental to apply preventive measures to minimize the exposure risks.