



## Service Priorities and Programmes Electronic Presentations

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### **Biological Hazards in a Negative Pressure Operating Theatre**

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### **Keywords:**

Negative pressure operating theatre; air sampling; environmental contamination

### **Introduction**

A proper ventilation design of the operating theatre (OT) is crucial for patient safety. After the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003, a conventional OT (OT1) was converted into negative-pressure for use in patients with infections requiring airborne precautions. Its performance was supported by a computational fluid dynamics model. However, this may result in potential risk to patients if contamination occurs in the surrounding areas.

### **Objectives**

To describe the investigation and control measures of fungal contamination in a negative-pressure operating theatre

### **Methodology**

In December 2015, air sampling after regular HEPA filter change in OTs revealed excessive growth of *Penicillium* and *Paecilomyces* species ( $>20$  CFU/m<sup>3</sup>) from OT1. The results of all the other OTs were satisfactory ( $\leq 10$  CFU/m<sup>3</sup>) with no fungi. The presence of fungal isolates persisted, although in decreasing trend, despite proper functioning of the ventilation system and repeated thorough surface disinfection in OT1. Extensive environmental scanning and inspection were performed. Repeated air sampling and surface swabbing of OT1 and the associated anesthetic room, scrub room as well as the surrounding areas were conducted. Differential levels of contamination were delineated by overnight settle plates.

### **Result**

The highest level of fungal contamination was around the ceiling and the automatic swing door at the corridor leading to OT1. Further investigation revealed an incident of water pipe leakage close to that ceiling 9 months ago. Dried water marks with multiple dark spots were detected at the fixed wooden & plastic boards supporting the false ceiling. Culture of the dark spots revealed heavy fungal growth. It was hypothesized that contaminated air moved into the negative pressure operating room via the clean corridor and the scrub/anesthetic rooms.

The following control measures were taken:

1. The wooden boards, plastic boards and all seals of the swing door were removed. The surrounding areas were disinfected and coated with anti-fungal paint
2. OT1 was converted back to positive pressure

The service was resumed after satisfactory air sampling results.

Conclusion

Our findings illustrated the importance of maintaining positive air pressure inside the operating theatre to exclude inward air movement. Organic materials (e.g. wooden boards) should be avoided in construction of operating theatre.