# The Institute of Healthcare Engineering and Estate Management

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**VENTILATION TECHNICAL PLATFORM (VTP)- Briefing Note**

## Potential Increased Risk of Aspergillus Infection due to COVID-19 & the Associated Essential Precautions & Control Measures to Consider

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### Introduction

The risks of aspergillosis infection in severely immunocompromised or neutropenic critical care patients is well known, however there is emerging evidence of patients suffering from serve COVID-19 infections also increasingly developing Aspergillosis co-infections.

Symptoms of some fungal diseases can be similar to those of COVID-19, including fever, cough, and shortness of breath. Laboratory testing is necessary to determine if a person has a fungal infection or COVID-19, with some patients having both COVID-19 and a fungal infection at the same time.

People with severe COVID-19, such as those in an intensive care unit (ICU), are particularly vulnerable to bacterial and fungal infections. The most common fungal infections in patients with COVID-19 include aspergillosis. These fungal co-infections appear to be reported with increasing frequency and can be associated with severe illness and death (see sample reference articles at end of briefing).

COVID-19-associated pulmonary aspergillosis

Scientists are still learning about aspergillosis (infections caused by the fungus Aspergillus) in people with severe COVID-19. In the past, scientists thought aspergillosis occurred almost entirely in people with severely weakened immune systems. However, aspergillosis has been increasingly reported in patients without weakened immune systems but who have severe respiratory infections caused by viruses, including influenza. Several recent reports describe COVID-19-associated pulmonary aspergillosis (CAPA).

Available information indicates that CAPA:

- usually occurs in patients with severe COVID-19 (e.g., patients on ventilators in ICUs)
- can be difficult to diagnose because patients often have non-specific symptoms and testing typically requires a specimen from deep in the lungs
- can cause severe illness and death

## What is Aspergillus?

Aspergillus is a fungus whose spores are ubiquitous in the environment, normally found in air (including hospital ventilation systems), water, soil, decaying plant matter, food, dust, and human habitats. This makes it extremely difficult if not impossible to tackle / control at the point of source.

- The fungal spores have an effective diameter of 2-3µ (21,000 times smaller than a golf ball)
- Infection is mainly via inhalation although direct wound contamination is also possible.
- Multiplication and growth are strongest in warm / damp environments (e.g. the human body).

Whilst Aspergillus rarely poses a threat to normal healthy people, it is recognised as a potential cause of severe illness and mortality in highly immunocompromised patients.

The primary route of infection is by inhalation of fungal spores which colonise the lungs and can spread via the bloodstream to other major organs. Infection is also believed to occur directly into deep wounds during surgery, however due to the hygiene standards in theatres and the relatively short exposure times involved this is not believed to pose a significant risk.

## Scope

Whilst the evidence and extent of any direct correlation of the potential of increased risk from aspergillus as a co-infection risk in COVID-19 patients remains to be fully established it is essential that all healthcare staff are aware of and minimise the potential risks associated with aspergillus. This will include Estates maintenance and project teams to ensure all appropriate risk assessments, precautions, and safe systems of work are developed and deployed to minimise the risks until such time as the clinical research can be established and verified. All works involving the potential disturbance of the building fabric or release of dust that could potentially impact a clinical environment should be assessed prior to work commencing.

## Background

As with most infection control issues the impact and control of aspergillus cannot be achieved in isolation by any one stakeholder, effective joint working is at the core of any precautions and management of the risk.

When hospital construction and refurbishment activities are in the planning stage, it is important to implement a strategy that attempts to protect patients at high risk, from aspergillosis and exposure to high ambient air spore levels. This will necessitate creating and maintaining an environment as safe as practically achievable and free of contamination including aspergillus spores.

It should also be considered that as aspergillus is an obliquus fungal spore which can travel for significant distances within the environment are where ‘at risk’ patients are cared for should be assessed to provide adequate protection from infection both via direct exposure from the general environment (this is the most common source of infection) and any potential exposure via the ventilation systems. Emerging evidence would suggest this may include some COVID-19 patients.

## Risk Assessment

The current HBN 00-09 'Infection control in the built environment' outlines the requirement for a multidisciplinary review and risk assessment for all significant refurbishment or construction works and with the potential elevated risks emerging from potential co-infection risks associated with COVID-19 it is essential that this approach be re-enforced and adopted for all works which could potentially increase the risk of release of aspergillus spores.

**Extract from Health Building Note 00-09: Infection control in the built environment - Appendix 3 – IPC risk assessment during construction/refurbishment of a healthcare facility**

Quality assurance in IPC associated with building work, fungal spore generation and susceptible patients should be centred on the three principles of:

a) identifying susceptible patient groups;
b) where necessary, using methods of work that reduce the dissemination of airborne fungal spores; and
c) protecting susceptible patients from those airborne fungal spores that will be generated.

The first principle is one of clinical risk assessment. The second and third are deciding on actions and ensuring those actions are constantly applied for the duration of the risk. This could be achieved by:

- instruction of those working on the project, those in the estates team and clinical staff in affected areas;
- routine monitoring of actions and precautions; and
- an efficient reporting and reaction system (should deficiencies be identified).

Patients who are highly immunocompromised are thought to be a particular risk from infection by inhalation of fungal spores whose airborne concentrations are thought to increase in association with demolition, construction, maintenance and refurbishment (that is, building) works. The occurrence of clusters of fungal infection associated with building works has been observed on a number of occasions, which suggests the need to minimise the risk of spore dispersal during this time. Many of the recommendations in this appendix are based on consensus rather than scientific observation. The following measures are thought to reduce the dissemination of spores, including aspergillus.

Help to reduce specific infection problems during construction

A planned contamination-control programme is essential when building work of any nature is planned.

Early and sustained involvement of the IPC team in the planning process is essential and will lead to minimising of potential infection risks. Building dust control measures may not be sufficient for the control of fungal spore release; therefore, the following should be considered:

- Use floor-to-ceiling barriers that completely enclose the work area.
- Seal windows in areas accommodating patients assessed as susceptible to minimise ingress of fungal spores generated by nearby building work.
- If vacuum cleaners are used, ensure they have high efficiency filters (tested, and maintained) on exhausted air.
- Use a vacuum cleaner with a HEPA filter to clean areas daily or more often if necessary.

- Transport debris in sealed bags or containers with tightly fitting lids, or cover debris with a wet sheet.
- The removal of debris by chutes is liable to produce airborne fungal spores. The use and positioning of chutes should be carefully considered.
- Do not haul debris through patient-care areas but through an exit restricted to the construction crew.
- Commission additional hotel services with regard to cleaning during construction projects.
- Temporary storage for clinical equipment and clean linen should be clean and free of pests.

**Monitoring**

Demonstration that measures have reduced ingress of fungal spores into protected areas can be demonstrated by active air sampling in protected areas and comparing fungal deposition on these with equivalent tests undertaken outside protected areas at the same time and for the same duration. It may also be prudent to undertake 'background' air sampling prior to the commencement of any project works to establish a 'normal or baseline' level.

There is limited evidence that occasional active sampling for fungal spores demonstrates that protective measures are effective.

**Essential Precautions & Control Measures to Consider**

Typically control measures for patients who are at identified as being at significant risk from aspergillus are treated in positively pressure ventilated lobby isolation rooms (PPVL) or similar. These rooms remain ideal for the care of COVID positive patients, however due to the levels of infection they are not practically available for all current or potentially at risk patients.

With COVID-19 patients cohorted in multi-bed ICU facilities where Aerosol Generating Procedures (AGP's) are routinely required and the need to maintain a negative pressure regime within these areas to minimise the risks of infection spread, a positive pressure approach is not practical. Maintaining a neutral pressure with protected airlocks would be the next best option to individual PPVL isolation rooms, however this may also not be practical to achieve in the current circumstances.

The third and most practical option to consider is likely to be to review the current filtration grade of the supply air supply to ideally ePM1@80% or better, and increased management of hygiene standards within the patient areas. In ideal situations the use of high-efficiency particulate air (HEPA) grade filtration can be considered to protect areas where vulnerable patients are cared for. However existing AHU plant is unlikely to be capable of being adapted to house HEPA filters and the static resistance of these filters could significantly reduce airflow performance. If upgrading of filters is considered then careful assessment of impacts to airflow and therefore dilution must be made and recorded to ensure continued safe operation and dilution within the clinical space. In all circumstances the correct installation, inspection, and testing to ensure air is not by-passing filters is essential.

Consideration could also be given to the use of 'air cleaning units' either within the immediate area of any internal project works or within vulnerable clinical areas, however the efficacy of such units is still to be established and extreme care should be taken not to rely solely on this form of air cleaning.

All construction or refurbishment scheme MUST employ enhanced dust control measures to minimise as far as practically possible all dust release from construction works involving disturbance of dust or building debris including demolition and ground works.

**All issues and control measures MUST be agreed by the multidisciplinary team and appropriately recorded in the risk assessment and be subject to 'in use' monitoring and review at regular intervals not exceeding monthly.**

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