



Cryptococcus Briefing for AE(V)'s, AP(V)'s & Estates Professionals

Acknowledgments

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Introduction

Following recent press coverage regarding an incident of two patient deaths at a Glasgow hospital, reported as 'due to infections of cryptococcus', the following information summary has been prepared to provide guidance and proportional advice to estates professionals, regarding any additional actions to consider to minimise or address estates ventilation related issues.

Cryptococcus is a pathogenic yeast fungus whose spores are ubiquitous in the environment, normally found in air (including hospital ventilation systems), soil, decaying plant matter, and bird excrement. This makes it extremely difficult if not impossible to control at the point of source.

- The fungal spores produced by the fungi have an effective diameter of between (1 to 2µm)
- Infection is mainly via inhalation although direct wound contamination is also possible.
- Multiplication and growth are strongest in warm and/or damp environments

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

Cryptococcosis has a number of identified strains including neoformans, gattii, albidus, and uniguttulatus which have all been identified in cases of human infection, there are also a total of fourteen non-infectious species. For the purposes of this briefing paper it is Cryptococcus neoformans that is referenced, as research suggests that this strain is the primary source for the majority of human infections.

Characteristics

Cryptococcus neoformans is a spherical yeast fungus, 3 µm in diameter when desiccated and 5 to 10µm in diameter when hydrated), that produces a capsule containing glucuronoxylomannan (GXM), extending the overall diameter to 25 µm or more.

The problem is the spores from the Cryptococcus are so small, like many other fungal spores such as 'aspergillus' etc., they can pass through the majority of filter grades with the exception of HEPA filters, and enable the spores to penetrate the alveoli within the lung more efficiently than other yeast organisms.

Mode of Transmission

Humans and animals can get the infection after inhaling the microscopic fungal spores from the environment. Cryptococcus neoformans infections are not contagious (human to human), although some research suggests that people may be exposed to Cryptococcus in the environment when they are children. Most people who breathe it in never get sick from it. However, in people who have weakened immune systems, Cryptococcus can stay hidden in the body and cause infection later when the immune system becomes too weak to fight it off.

Incubation Period

Unknown, Cryptococcus neoformans can colonize in the host respiratory tract for months to years without causing any clinical symptoms



How common are *Cryptococcus neoformans* infections?

Cryptococcus infections are rare among people who have healthy immune systems; however, *Cryptococcus* can be a major cause of illness in people with HIV/AIDS or patients who have severely weakened immune systems (transplant/oncology).

Pathology

Infection with *Cryptococcus neoformans* is termed Cryptococcosis. Most infections with *Cryptococcus neoformans* occur in the lungs. However, fungal meningitis and encephalitis, especially as a secondary infection for severely immunocompromised patients, are often caused by *Cryptococcus*, making it a particularly dangerous fungus. Infections with this fungus are rare in those with fully functioning immune systems

Infection starts in lungs, disseminates via blood to meninges and then to other parts of the body. *Cryptococcus* can cause a systemic infection, including fatal meningitis known as meningoencephalitis in normal, diabetic and immunocompromised hosts. The infection from *Cryptococcus neoformans* in the brain can be fatal if untreated. CNS (central nervous system) infection may also be present as a brain abscess known as Cryptococcomas, subdural effusion, dementia, isolated cranial nerve lesion, spinal cord lesion, and ischemic stroke. If Cryptococcal meningitis occurs, mortality rate is between 10–30%.

Potential Risk Groups

- Organ Transplants
- Oncology / Cancer treatment
- Patients on high dose steroids
- Haematology
- I.C.U. / P.I.C.U.
- S.C.I.D.S. / B.M.T.
- HIV Positive patients
- Laboratory Facilities

Suceptibility to Disinfectants

Cryptococcus neoformans is effectively killed by 70% ethyl alcohol and is susceptible to phenolic compounds, formaldehyde, glutaraldehyde, iodophors, and sodium hypochloride (1%)

Potential Additional Maintenance Precautions

- Ensure all plantrooms and air handling unit air intake areas are clear and secured.
- All air intakes should be clear of debris and where practical the immediate surrounding area should be clear of vegetation and any accumulation of bird faeces should be cleaned at regular intervals.
- In all cases where bird ingress to plant areas is evident, it should be dealt with and cleaned up immediately upon discovery.
- Birds must be prevented from nesting or congregating close to any AHU intake. If anti-roosting netting has been recently installed, birds will be displaced and nest elsewhere, special attention should be given to ensure that they do not nest near AHU air intakes.



- All filters should be subject to routine inspection and changed when indicated by pressure drop.
- All anti-roost netting should be inspected as part of the existing quarterly inspection protocol for all critical ventilation AHU plant.
- The IPC team and estates team should establish a regular review meeting to identify clinical areas where patient susceptibility may be high and immunocompromised patients are treated. In extreme cases of known risk consideration should be given to provision of temporary or permanent HEPA filtered positive pressure ventilation systems, however this is not anticipated to be a routine requirement for the majority of healthcare environments.

For specific issues or concerns the Trust Authorising Engineer (Ventilation) should be contacted to work with all estates and clinical stakeholders to agree additional precautionary measures.

References & Further Reading

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