Hospital linens were identified as the agent of transmission during an outbreak of mucormycosis that resulted in 5 deaths at a pediatric hospital in Louisiana, according to findings published recently in The Pediatric Infectious Disease Journal [1].

CDC researchers assisted hospital staff in their investigation of the 2008-2009 mucormycosis outbreak. They sought to identify possible modes of transmission of pathogens in the environment and prevent additional infections. The investigators inspected the hospital for potential sources of mold, including the hospital's heating, ventilation and air conditioning systems. Because an initial investigation indicated an association with linens, they visited an off-site laundry facility that contracted with the pediatric hospital and observed the procedures and workflow of the facility. They collected environmental samples for fungal culture, and CDC conducted genotypic and phenotypic analyses of all patient and environmental culture samples.

The investigators found hospital-associated cutaneous mucormycosis in 5 patients over 11 months, all of whom died. A total of 3 of the patients had conditions known to cause susceptibility to mucormycosis, while 2 had cardiac conditions with ongoing acidosis. The cases occurred on different hospital wards, and hospital linens were the only exposure shared between all 5 patients. _Rhizopus_ species were identified in 26 (42 per cent) of 62 environmental samples collected from clean linen and related areas, and in 1 (4 per cent) of 25 samples taken from non-linen related items.

The patients were infected with _Rhizopus delemar_, which was also identified from cultures of clean linens and clean linen delivery bins from the laundry facility.

According to the researchers, these findings underscore the importance of proper handling and storage of clean hospital linens. "When mucormycosis occurs in hospitalized patients, particularly when several cases occur in a temporally clustered manner or share an unusual presentation, attempts should be made to identify a mold source or route of transmission for which control measures can be implemented," the researchers wrote. "Hospital linens should be considered as a potential vehicle for the transmission of pathogenic molds. Clean linens need to
be handled and stored in a manner that prevents contamination in order to keep them clean prior to patient use."


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[Zygomycoses are infections caused by fungi of the orders _Mucorales_ and _Entomophthorales_. _Mucorales_ includes organisms of species _Rhizopus_, _Rhizomucor_, _Mucor_, _Apophysomyces_ and _Cunninghamella_. These fungi are ubiquitous in the environment, such as soil and decaying vegetable matter. Most zygomycoses are caused by _Mucorales_ species, and mucormycosis is the name given to these infections. Although most individuals are exposed to these fungi daily, usually mucormycosis occurs in individuals with predisposing medical conditions such as immunosuppression and diabetic ketoacidosis. However, necrotizing soft tissue infections caused by _Mucorales_ species have been described in immunocompetent individuals as a result of traumatic injuries following tornados, tsunamis, and volcanic eruptions (see ProMED-mail post Mucormycosis, fatal - USA: (MO) tornado-related 20110612.1789).

Most human infections result from inhalation of fungal spores that have been released in the air or from direct inoculation of organisms into disrupted skin or mucosa. _Mucorales_ species are angioinvasive, causing infarction of the involved tissue, and the mucormycosis spectrum ranges from cutaneous, rhinocerebral, and sinopulmonary to disseminated and frequently fatal infections, especially in immunocompromised hosts.

The diagnosis of mucormycosis almost always requires histopathologic evidence of fungal invasion of the tissues. Culturing these organisms from an infected site is rarely sufficient to establish the diagnosis because the fungus may colonize tissue without causing infection and is a relatively frequent laboratory contaminant.

Nosocomial mucormycosis has been associated with a variety of healthcare-associated procedures or devices, such as cutaneous infection related to the direct inoculation of the fungus on the wound or skin surface, usually from contaminated wound bandages, contaminated karaya, a plant-derived adhesive used for ostomy bags, or contaminated medication patches; mucormycosis has also followed use of contaminated wooden tongue depressors to prepare oral medications given to patients through a nasogastric tube or to construct splints for intravenous and arterial cannulation sites; and aerosolized fungal spores in ventilatory systems as a result of construction (<http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2009.02982.x/full>).]
In another nosocomial outbreak, water damage to a linen store and patient shower room promoted fungal growth, which contaminated the surrounding air that circulated in close proximity to the infected patients' rooms was the source of rhinocerebral mucormycosis in a paediatric oncology department (<http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2009.02982.x/full>).

The news report above refers to an investigation of an outbreak of mucormycosis that resulted in 5 deaths at a pediatric hospital in Louisiana in 2008-2009, recently published in The Pediatric Infectious Disease Journal online ahead of print. Hospital linens were identified as the agent of transmission in this outbreak. The investigators concluded, "hospital linens should be laundered, packaged, shipped, and stored in a manner that minimizes exposure to environmental contaminants." - Mod.ML

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