Notes from the Field

Probable Mucormycosis Among Adult Solid Organ Transplant Recipients at an Acute Care Hospital — Pennsylvania, 2014–2015

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On September 17, 2015, the Pennsylvania Department of Health (PADOH) notified CDC of a cluster of three potentially health care–associated mucormycete infections that occurred among solid organ transplant recipients during a 12-month period at hospital A. On September 18, hospital B reported that it had identified an additional transplant recipient with mucormycosis. Hospitals A and B are part of the same health care system and are connected by a pedestrian bridge. PADOH requested CDC's assistance with an on-site investigation, which started on September 22, to identify possible sources of infection and prevent additional infections.

Mucormycosis is a severe, often fatal infection caused by a group of angioinvasive molds. Outbreaks of health care–associated mucormycosis have been identified, most commonly in persons with marked immunosuppression, such as bone marrow and solid organ transplant recipients (*1*,*2*). Sources of these outbreaks are difficult to determine given that mucormycetes are ubiquitous environmental organisms. Past outbreaks have been associated with contaminated medical supplies and hospital construction projects (*3*,*4*). Performing an Infection Control Risk Assessment (ICRA) before and during construction or renovation projects is an important measure that can reduce the risk for health care–associated mucormycosis (*4*,*5*). An ICRA is a multidisciplinary approach used to mitigate environmental sources of microbes and to prevent infectious hazards through use of built environment design, ventilation and infrastructure support, and control measures implemented during construction or renovation (*6*).

A probable health care–associated case of mucormycosis was defined as identification of a mucormycete by culture or molecular testing in a diagnostic specimen from a person who had a history of solid organ transplantation, and admission to hospital A or B during May 2014–September 2015 for ≥14 days, within the 30 days before diagnosis. The period for cases was expanded beyond the 12-month period of infections to account for exposure time during hospitalization. Suspected cases were similarly defined as identification of a mucormycete in a diagnostic specimen by histopathology only or association with a hospital stay of 7–13 days before diagnosis. No infections were considered confirmed health care–associated cases because of uncertainties regarding the incubation period of mucormycosis (*3*).

The initial three cases were classified as probable and the fourth case as suspected. All four patients underwent solid organ transplantation during the same admission as their mucormycosis diagnosis and were receiving immunosuppressive medications as well as voriconazole for antifungal prophylaxis. The three probable cases were in patients who were primary heart (two cases) and lung transplant (one case) recipients who underwent transplantation 31–93 days before mucormycosis diagnosis. The suspected case occurred in a patient who had been admitted for a second liver transplant and was taking immunosuppressive medications at home; mucormycosis was diagnosed in this patient 13 days after admission, although signs compatible with invasive fungal infection started earlier in the admission. At least two different mucormycete species were isolated from the four patients. Three of the four patients had died before the arrival of the PADOH/CDC team.

The three patients with probable health care–associated mucormycosis all received care in the same room (room A) of the 20-bed cardiothoracic intensive care unit (CTICU) in hospital A for 14–58 days between their transplantations and mucormycosis diagnoses. Room A was the only negative-pressure isolation room in the CTICU and was adjacent to a door leading to a carpeted hallway and family room. Frequent use of this door by personnel and visitors might have disturbed airflow, allowing dust and mold spores, if present, to enter the room. None of the patients had a clinical indication requiring negative-pressure isolation. The patient with suspected health care–associated mucormycosis did not spend any time in room A of the CTICU or a negative-pressure room.

Before the PADOH/CDC on-site investigation had begun, hospital A had closed and deconstructed the CTICU for renovation. A mucormycete genetically unrelated to the patient isolates was recovered from one air sample from room A that hospital A obtained before the renovation work began. Multiple construction and demolition projects were occurring at or near hospitals A and B during the period when this cluster occurred. However, the hospital system reported performing ICRAs for these projects. No common construction-related exposure shared by the four patients was identified.

Although voriconazole is a commonly used antifungal prophylactic agent among transplant recipients in the United

States, it is ineffective against mucormycetes (*3*). Before the PADOH/CDC investigation, the hospital system changed the antifungal prophylactic agent used for transplant recipients to isavuconazole, a mucormycete-active prophylactic agent.

Hospitals A and B are no longer using negative-pressure rooms to house solid organ transplant patients who are without a clinical indication. Caring for immunosuppressed patients in negative-pressure environments has been previously identified as a risk factor for invasive mold infections, possibly related to the potential to concentrate dust and mold spores in these rooms (*7*). Negative-pressure rooms are recommended for isolation of patients with a suspected or confirmed airborne infectious disease; this investigation highlights how unnecessary placement of immunocompromised patients in negative-pressure rooms could result in net harm and therefore should be avoided.

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