



KEY POINT SUMMARY

OBJECTIVES

To assess the effectiveness of ICRA-influenced measures in minimizing the risk of *Aspergillus* spread before, during, and after a demolition project within a university hospital.

Evaluation of nosocomial infection control measures to minimize the risk of aspergillus dispersion during major demolition work: A case study of a Japanese university hospital

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Key Concepts/Context

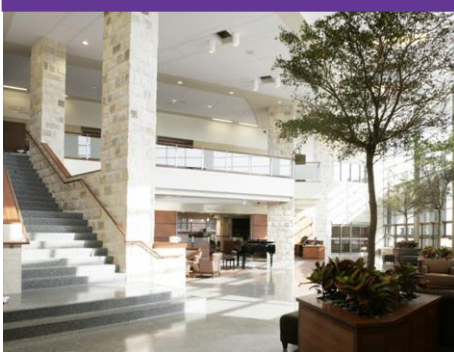
Aspergillus species (spp), can be dispersed during activities such as construction, renovation, and demolition. The infection control risk assessment (ICRA) tool was developed in part to counteract the spread of infection in these situations. This study uses an adapted version of the ICRA in a demolition project at a Japanese hospital, concluding that trace amounts of *Aspergillus* spp could be found in a ward with close horizontal and vertical air intake from the demolition site.

Methods

This study took place at a 992-bed hospital, where the first floor of a radiotherapy facility measuring 682 meters squared (m²) was being demolished over the span of one month. The demolition site was surrounded by three more hospital buildings, dubbed X, Y, and Z.

Before demolition, a team of facility management and infection control staff conducted the ICRA. Following the ICRA, the team took the following preventative measures:

- Educated construction workers about the risks of demolition and the necessity for preventative measures
- Installed roughing filters at all air intake locations in the three surrounding buildings
- Sealed the windows of the three surrounding buildings
- Doused the demolition site with water jets to reduce dust and spore emissions



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- Posted signage cautioning people to keep windows closed
- Prohibited construction workers from entering the surrounding hospital buildings

Air sampling was performed before, during, and after the demolition at a rate of 100 Liters per minute (L/min) using an RCS High Flow Touch Microbial Air Sampler (Merck Millipore, Co., Lit., Tokyo, Japan) in the corridors, patient rooms, and balconies of two floors in building X and two floors in building Y. Building Z was included due to its lack of outdoor air intake. At each site, 320 L (84.53 gallons) of air were collected on malt extract agar plates. All samples were analyzed at a nearby clinical microbiology laboratory.

Meteorological data were gathered from a local agency, providing information on wind speeds and direction, temperature, and rainfall during the sample period. To determine the number of *Aspergillus* colony-forming units (CFUs) and factors related to the demolition project, multiple regression analysis was used.

Findings

On all outdoor balconies, a large, undetermined amount of bacteria and mold colonies were detected prior to demolition. After demolition, the number of colonies in these areas decreased. During demolition, *Aspergillus* colonies were detected only in the corridor and room of building Y, location 5 during construction. No cases of aspergillosis were reported during or after the demolition work.

Statistical analysis found that no independent variables were significant predictors for the number of *Aspergillus* CFUs. However, when the three variables of demolition work, the vertical height distance of outside air intake from the demolition site, and horizontal air intake distance from the demolition site were considered in combination, statistically significant correlations were found. When considered in combination, and under the circumstances of “demolition in progress”, “low ward height”, and “air intake close to demolition site”, the amount of *Aspergillus* CFUs per cubic meter increased significantly.

Overall: During and after demolition, *Aspergillus* CFUs were only detected in significant amounts in one location (building Y, location 5). This is because this location was at a relatively low height and there was a relatively small distance between the location’s outdoor air intake and the demolition site. The authors note that this result is somewhat obvious due to the behavior of dust; however, it is significant due to the amount of preventative measures that were taken.

Limitations

The authors note several limitations within this study. This study involved a relatively small sample size and took place at a single location, making its results not



necessarily universally applicable to all construction sites in different locations. There is also always a chance that the infection control team monitoring for invasive Aspergillus may have unintentionally left a few cases undetected. The incubation period for Aspergillus is unknown, meaning a longer observation period may have yielded different results. Lastly, although meteorological data were gathered, these data were not analyzed in relation to the increase or decrease of Aspergillus.

Design Implications

This study found that even after following infection control measures based on the ICRA, Aspergillus fungi may still enter the air intake sites of buildings surrounding a construction, renovation, or demolition project. Extra precautionary measures therefore must be taken for buildings that have air intake locations at a close vertical and/or horizontal distance from a given construction site.

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