Abstract
Background: We investigated an increase in hospital-acquired invasive fungal infections (HA-IFI) among patients admitted to adjacent hematopoietic stem cell transplant (HSCT) and hematologic malignancy (HM) wards in the setting of a large construction project adjacent to the hospital. Methods: We defined cases of HA-IFI as HSCT or HM patients who met criteria for probable or proven IFI with suspected inpatient acquisition. We hypothesized that outside construction increased internal particle/spore counts despite pre-construction prevention efforts. The environmental investigation included an evaluation of storage/distribution of supplies, air handler inspections, air particulate counts, and bioaerosol sampling of airborne fungal spores.

Results: From October 2017 - January 2018, 11 cases of probable/proven HA-IFI occurred (Figure 1). Infections caused by multiple pathogens (Figure 2) ranged from pneumonia and sinustis to disseminated disease. Bioaerosol sampling and particulate counts were taken from unit corridors and rooms on both wards. Fungal species identified via bioaerosol sampling were primarily Penicillium and Cladosporium, with rare Aspergillus identified. Geometric mean particulate counts of 1 micron aerodynamic size were reduced by 86% and 75% on the HM and HSCT wards, respectively (Figure 3).

Conclusions: We describe a multi-species outbreak of IFI in HM and HSCT patients potentially associated with new building construction that occurred despite implementation of multiple pre-construction efforts. A multifaceted strategy to improve air quality and protect patients on and off high-risk units was needed to mitigate the outbreak.

Background
• Large, construction project adjacent to the building.
• Noted increase in HA-IFI among patients with hematologic malignancies and undergoing HSCT.

Methods
• Evaluation and inspection of process for management and distribution of supplies and linen.
• Visual inspection and evaluation of air handling units serving these two units for presence of dust/debris and filtration by-pass.
• Air particulate counts
• Bioaerosol microbial sampling for presence of viable and non-viable fungal spores.

Results
• 11 Cases of HA-IFI from October 2017-January 2018 (Figure 1).
• Numerous fungal species causing HA-IFI (Figure 2)
• Fungal species identified during bioaerosol sampling were primarily Penicillium and Cladosporium species, with rare identification of Aspergillus species
• Geometric mean particulate counts of 1µm aerodynamic size were reduced by 86% and 75% on the HM and HSCT wards, respectively (Figure 3)

Conclusions
• Multiple intrinsic and extrinsic sources of fungal spore dispersion were identified that contributed to increase in HA-IFI.
• Multi-faceted intervention was required to mitigate the increase in HA-IFI
• Removal of cardboard from supply delivery, modifications to air handler units to reduce outdoor air exchanges and optimize room pressurization, implementation of N-95 use by HSCT patients when off unit, modification to linen handling and storage, reinforcement of door seals.