An Outbreak Investigation of Pulmonary Infections Caused by *Mycobacterium abscessus* in a Cardiothoracic Transplant Population

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Background

- *M. abscessus* is a rapid-growing nontuberculous mycobacteria (NTM) that can form biofilms in municipal water systems and is difficult to eliminate.
- Treatment often requires prolonged antibiotic therapy due to the intrinsic drug resistance of *M. abscessus*.
- *M. abscessus* infection is an absolute contraindication to lung transplantation in some transplant centers due to being associated with allograft dysfunction and higher mortality.[1]
- In 2021, our institution identified a significant increase in pulmonary infections caused by *M. abscessus* in the cardiothoracic transplant population.

Methods

Outbreak Investigation

- *M. abscessus* cases among inpatients between January 2019 and September 2021 at our institution and clinical characteristics were extracted from the electronic medical record (EMR).
- A multidisciplinary team conducted an investigation to identify variations in practice related to the source of water used for clinical care activities in this identified population.
- Elimination of tap water use has been shown to reduce hospital-associated *M. abscessus* infections in the literature.[2]

Intervention

- Use sterile water for all clinical care practices involving water and for all patient water drinking needs in the post-heart and pre-/post-lung transplant population impacted by the outbreak.
- The only use of tap water in this identified population is hand hygiene and patient bathing.
- Phase I: intervention in three units most impacted by the outbreak.
- Phase II: intervention in all inpatient areas in institution.

Results

Clinical Characteristics in 2021 Cohort

- Higher proportion of post-heart and pre-/post-lung transplant patients in 2021 cohort compared to 2019-2020 (58% vs. 9%, respectively).

Table 1: Clinical Characteristics in 2021 Cohort

Demographics	# Patients (N=12)
Age in years, median (IQR)	51 (40,62)
Male sex at birth	6 (50%)
Race and Ethnicity	
White/Hispanic or Latino	2 (17%)
White/Not Hispanic or Latino	4 (33%)
Black or African American/Not Hispanic or Latino	4 (33%)
Other/Unknown/Declined	2 (17%)
Charlson Comorbidity Index Score, median (IQR)	3 (1,4)
Hospitalizations within prior 180 days	6 (50%)
COVID-19 Disease History	4 (33%)
Underlying Comorbidities	
Cardiovascular Disease	6 (50%)
Pulmonary Disease	10 (83%)
Renal Disease	6 (50%)
Transplant Data	
Lung Transplant	6 (50%)
Post-Transplant	4 (67%)
Pre-Transplant	2 (33%)
Heart Transplant	1 (8%)
Days from Transplant Surgery to First Culture Collection, median (IQR)	255 (108,448)
Specimen Type	
Bronchoalveolar lavage (BAL)	6 (50%)
Sputum	4 (33%)
Lung tissue	1 (8%)
Endotracheal aspirate	1 (8%)
Other	3 (25%)

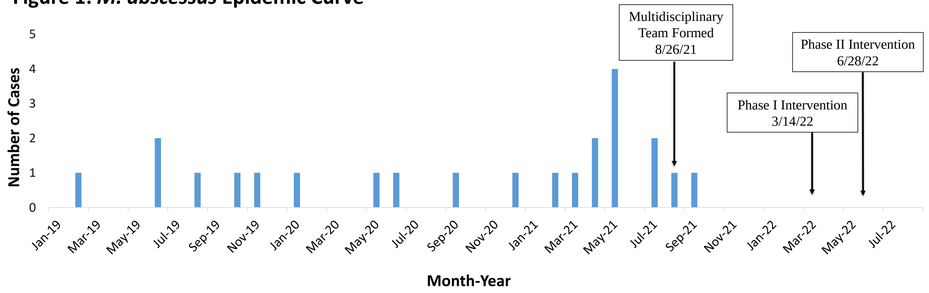
Results

Table 2: Patient Care Practices Involving Water

Patient Care Practice	# Patients (N=12)	Water Practice	Source of Water
Bronchoscopy	7 (58%)	Irrigating bronchoscope	Sterile*
Tracheostomy Care	3 (25%)	Rinsing cannula, cleaning stoma	Sterile*
Nasogastric/Dobhoff Tube Insertion/Removal	4 (33%)	Flushing tube	Sterile*
Extracorporeal Membrane Oxygenation (ECMO)	2 (17%)	Filling heater-cooler units	Sterile* & Filtered*
Nebulizer Treatments	11 (92%)	Rinsing nebulizers	Sterile* & Tap
Mechanical Ventilation	4 (33%)	Performing oral care	Filtered & Tap
CPAP/BiPAP	3 (25%)	Cleaning device	Bottled* & Tap
Swallow Screens	5 (42%)	Giving water for drinking	Filtered & Tap
Oral Medication Administration	12 (100%)	Reconstituting oral medication	Filtered & Tap
Routine Activities	12 (100%)	Bathing, brushing teeth, drinking	Filtered & Tap

*indicates this source was recommended in the institutional policy at the time.

Figure 1: *M. abscessus* Epidemic Curve



Discussion

- Early results show a reduction of *M. abscessus* cases in inpatient areas most impacted by the outbreak following formation of multidisciplinary team and subsequent implementation of sterile water protocol.
- *M. abscessus* surveillance is ongoing to determine sustained effectiveness of the initiative.

References

[1]Chandrashekaran S, Escalante P, Kennedy CC. Mycobacterium abscessus disease in lung transplant recipients: Diagnosis and management. *J Clin Tuberc Other Mycobact Dis* 2017; 9: 10-18.
[2]Baker AW, Lewis SS, Alexander BD, et. al. Two-Phase Hospital-Associated Outbreak of Mycobacterium abscessus: Investigation and Mitigation. *Clin Infect Dis* 2017; 64(7): 902-11.