

Mycobacterium mucogenicum Outbreak Investigation

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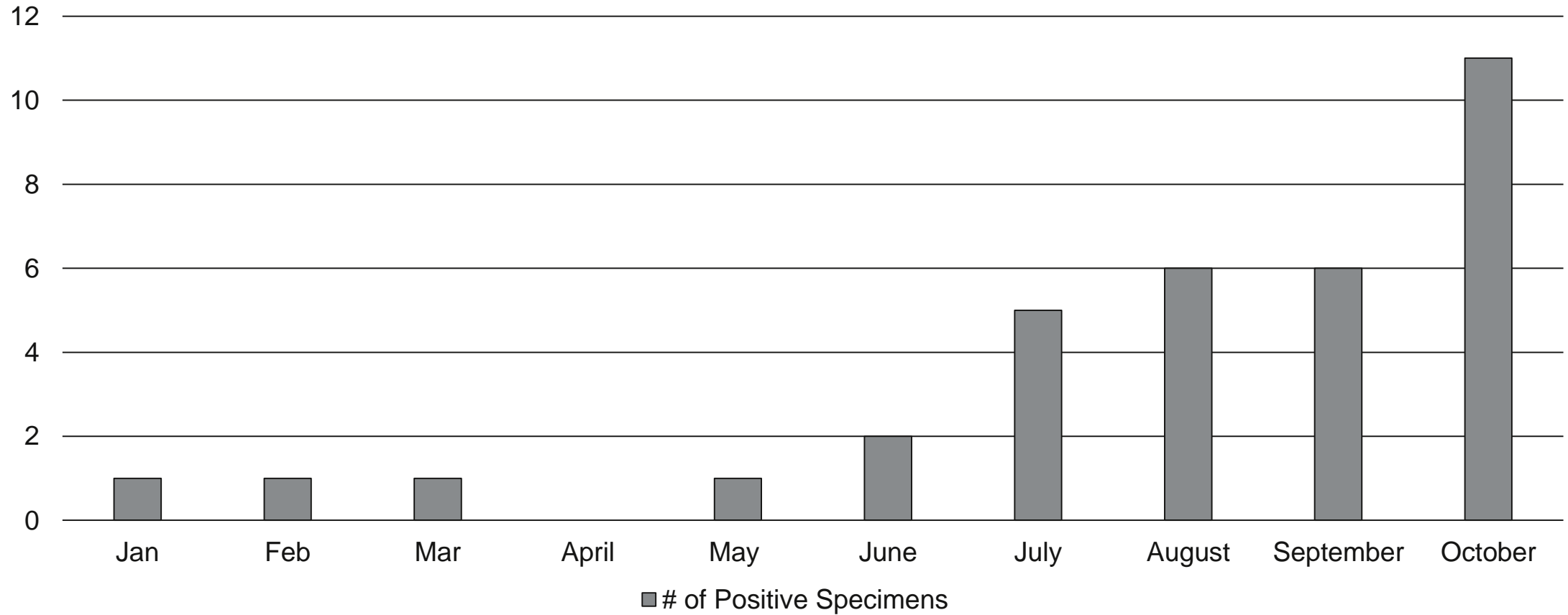
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INTRODUCTION

- Wisconsin Diagnostic Laboratory
 - Mycology and mycobacteriology specific laboratories
- Fall 2022
 - Increase in identification of *M. mucogenicum* gp on fungal media
 - 1 colony
- Rapidly growing *Mycobacteria*
 - Group: *M. mucogenicum*, *M. phocaicum*, *M. aubagnense*
 - Ubiquitous in environment, water sources
 - Rare human pathogen
 - Health-care associated (e.g., catheter-related sepsis)

REPORTING REVIEW

Number of Patients with *M. mucogenicum*



POSITIVE SAMPLES

Specimen Source	Test	Collection Date	Collection Department
Lung, Left Lingula	Fungus Culture	5/18/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Respiratory Culture	6/6/2022	FH MIC
LUL (Left Upper Lobe)	Acid Fast Bacilli Culture	6/22/2022	FH OR IPP
Lung, Right	Fungus Culture	7/5/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	7/21/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	7/21/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Acid Fast Bacilli Culture	7/25/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	7/25/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	7/26/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	7/26/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	8/4/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Acid Fast Bacilli Culture	8/16/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	8/16/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	8/30/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	8/31/2022	FH OR IPP
BAL (Bronchial Alveolar Lavage)	Fungus Culture	8/31/2022	FH OR IPP
Lung, Left	Acid Fast Bacilli Culture	9/12/2022	FH OR IPP
Lung, Left	Acid Fast Bacilli Culture	9/23/2022	FH OR IPP
RUL (Right Upper Lobe)	Fungus Culture	9/27/2022	FH OR IPP
Lung, Left	Fungus Culture	9/28/2022	FH OR IPP
RML (Right Middle Lobe)	Fungus Culture	9/28/2022	FH OR IPP
RUL (Right Upper Lobe)	Acid Fast Bacilli Culture	10/3/2022	FH OR IPP
RUL (Right Upper Lobe)	Fungus Culture	10/3/2022	FH OR IPP
Lung, Left	Fungus Culture	10/10/2022	FH OR IPP

FINDINGS

- 24 patients connected by the same Minor Procedure Area (MPA)
- All on BAL samples only
- Conclusion
 - Not lab contamination
- Collaboration:
 - Evaluate the potential source
 - Infection prevention (IPAC), microbiology, facilities, minor procedure area (MPA), and sterile processing department (SPD)
 - Medical director, ID physician review
 - Chart review and communication with provider for each patient involved

LITERATURE REVIEW

A bronchoscopy-associated pseudo-outbreak of *Mycobacterium mucogenicum* traced to use of contaminated ice used for bronchoalveolar lavage

Published online by Cambridge University Press: 15 November 2019

Judie Bringham, David J. Weber, Melissa B. Miller, Melissa C. Jones, M. Patricia Rivera, Jason Akulian, William A. Rutala and Emily E. Sickbert-Bennett

> [Am J Infect Control](#). 2020 Jul;48(7):765-769. doi: 10.1016/j.ajic.2019.11.019. Epub 2019 Dec 24.

Pseudo-outbreak of *Mycobacterium fortuitum* in a hospital bronchoscopy unit

> [Infect Control Hosp Epidemiol](#). 1997 Feb;18(2):136-7. doi: 10.1086/647570.

A pseudo-outbreak of *Mycobacterium chelonae* infections related to bronchoscopy

R Cox¹, K deBorja, M C Bach

Affiliations + expand

PMID: 9120244 DOI: 10.1086/647570

Poster Abstracts / American Journal of Infection Control 45 (2017) S16-S93

Outbreak Investigation and Emerging/Reemerging Infectious Diseases

Session OI-178

12:30-1:30 p.m.

“You’re Rinsing with What?” An Investigation into a Pseudo-Outbreak Within the Bronchoscopy Suite

Infection Prevention & Control
Oregon Health & Science University
Chair Infectious Disease, Medical
Control, Oregon Health & Science
Keenan Williamson, MPH,
Health & Sciences University
Manager, Oregon Health & Science
RN, Infection Preventionist,
University; **Kevin Langstaff**
Health and Science University
Preventionist, OHSU; **Molly**

INITIAL INVESTIGATION

- Infection Prevention observations, interviews
 - Minor Procedure Area (MPA) performs bronchoscopy procedures
 - Pulmonology providers, anesthesia providers, Procedure Arrival and Recovery (PAR) nurses, operating room nurses and respiratory therapists
- Suspected sources
 - Syringe of saline on ice
 - May be needed during the procedure to stop bleeding
 - The end of the syringe is open (not covered)
 - Syringe/ice bucket near MPA room sink
 - May be a risk for contamination with *Mycobacteria* from sink
 - Storage near sink
 - Bronchoscopes
 - Two linked to several procedures

INITIAL INVESTIGATION

- Infection Prevention reviewed bronchoscope cleaning practices

- Sterile Processing Department (SPD)
 - Change in reprocessing personnel in May 2022
 - Re-training of personnel
- Current practice
 - High level disinfection for bronchoscopes after each procedure
- Two bronchoscopes also near/past end of life
 - Increase in repairs in the last year
 - Areas for biofilm formation?
 - Cannot evaluate for cracks/breaks in lumen
- Update: weekly sterilization?

Flexible Bronchoscopes and Updated Recommendations for Reprocessing: FDA Safety Communication



Date Issued: June 25, 2021

The FDA is reminding health care facilities and staff responsible for reprocessing bronchoscopes and their accessories about the importance of carefully following the manufacturer's reprocessing instructions. Additionally, the FDA recommends the following:

- **Consider using sterilization instead of high-level disinfection when feasible**, because sterilization has a greater safety margin than high-level disinfection. Steps should include precleaning, leak testing, cleaning, and sterilization.
 - If sterilization is not available, then high-level disinfection steps should include precleaning, leak testing, cleaning, high-level disinfecting, rinsing with tap or utility water followed by alcohol flushing or with critical (filtered or sterile) water, and drying.

INITIAL SAMPLE COLLECTION

- Collection
 - Swab/brush bronchoscope
 - MPA drain swabs
 - Ice from ice machine
 - Bronchoscope saline flush
- Incubation:
 - Decontaminated
 - Plated to 7H10, LJ, saline collections put into trek bottles
 - Incubated for 8 weeks
 - Routine Kinyoun for AFB

SAMPLE COLLECTION

- Increase sample volume
- Eurofins: sterile saline, filtration, and placed filter on 7H10
 - Flushed saline through scope #1 and scope #2
 - Collect filtrate in sterile 2L bottles, concentrated onto sterile filter
 - Run a cleaning brush through the scope
 - Collect more saline flushed through scope
 - Large volume (4L) saline flush and concentration on filters
 - MPA sinks
 - Sink 1 hot and cold water x 200mL - filtered
 - Sink 2 hot and cold water x 200mL - filtered
 - Bag of ice – filtered
 - Ice machine water input filtrate
 - Sterile processing HLD rinse sink water filtrate

MYCOBACTERIUM ISOLATION

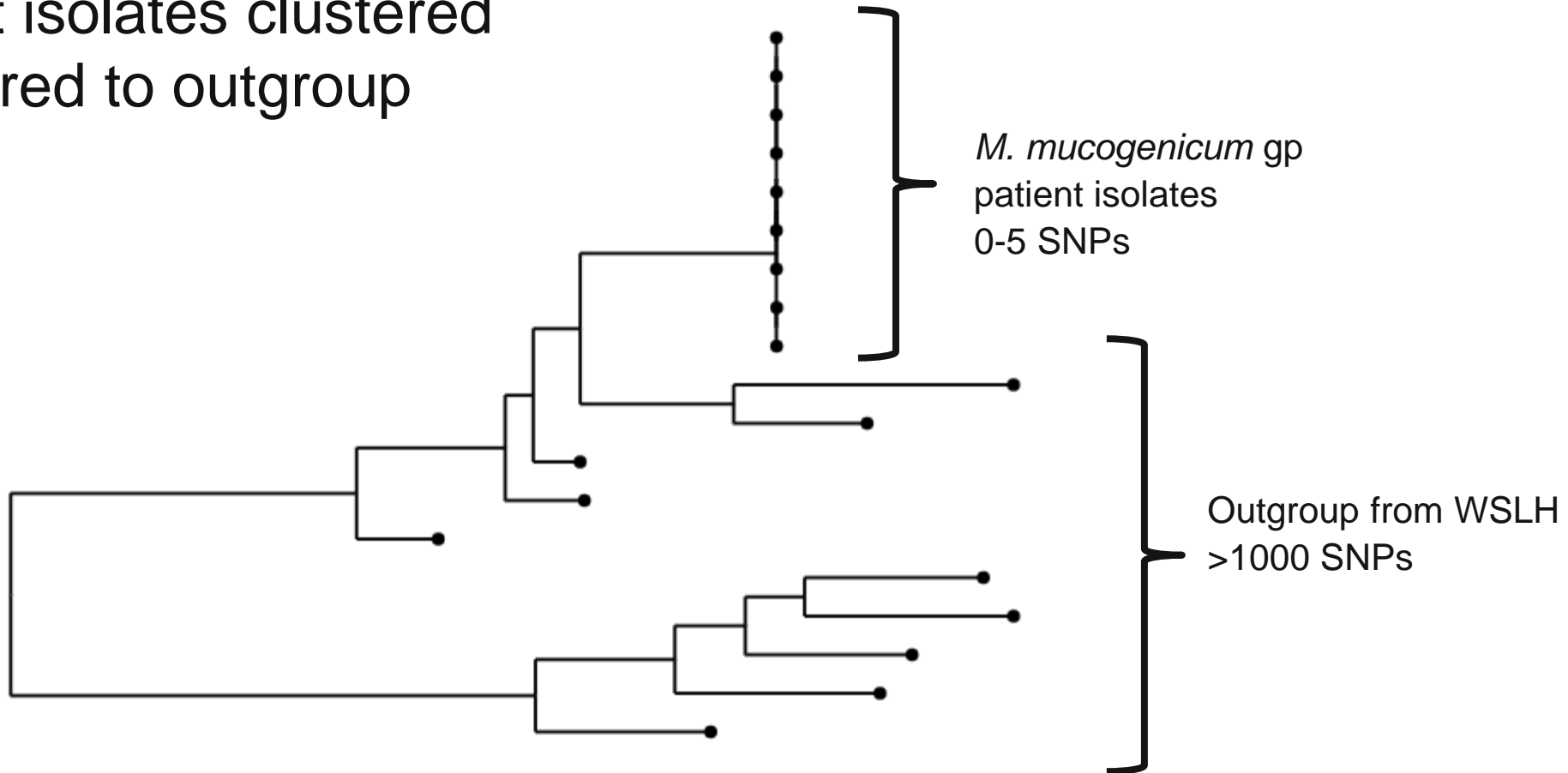
- AFB smear routinely (hold 8 weeks)
 - Evaluate for smear positives → isolate and identify
 - Struggle with bacterial overgrowth
- No *M. mucogenicum* recovered from the bronchoscope
- Recovered *M. mucogenicum* gp from:
 - Procedure room sinks 1 (hot and cold water)
 - Procedure room sink 2 (hot water)
 - Ice machine water (2 morphologies)

GENOMIC SEQUENCING EVALUATION

- Are patient samples genetically related?
 - 9 patient *M. mucogenicum* gp isolates for whole genome sequencing (WGS) at WSLH
- How different are *M. mucogenicum* sequences?
 - WSLH compared to an outgroup, unrelated to our investigation
- Are the patient isolates related to the environmental isolates?
 - 5 environmental isolates to WSLH for sequencing

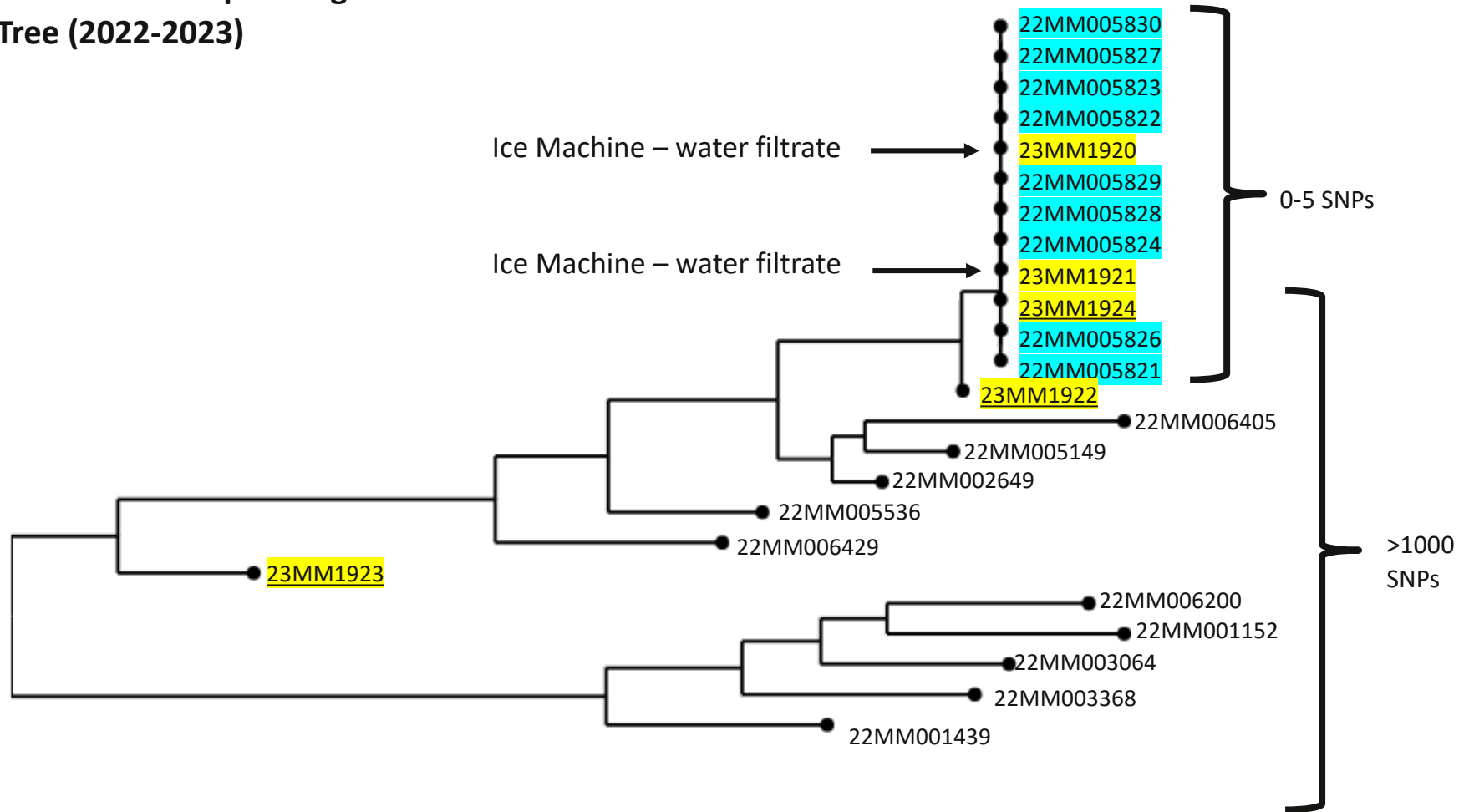
SEQUENCING RESULTS

- Patient isolates clustered compared to outgroup



SNP = single nucleotide polymorphism

M. mucogenicum Whole Genome Sequencing - Phylogenetic Tree (2022-2023)



-FH Environmental isolates (sink water; ice machine water)

-FH Patient isolates

-Outgroup (non-FH isolates)

MITIGATION STRATEGIES

- Re-training in sterile processing department
- Saline syringes
 - Capped and placed in a bag on ice
 - Add additional protection from contact with ice
- Bronchoscopes were sent for an initial sterilization
 - Additionally, sterilize the scopes at least once per week
 - Not enough inventory to sterilize after each procedure and maintain turnaround time

SUMMARY

- Low level contamination of *M. mucogenicum* gp
- Multidisciplinary team organized to evaluate potential source of contamination
 - Observe for potential “gaps” in practice/procedures
 - Areas for improvement
- Sampled various environmental sources
- Isolates were genetically related
 - Patient isolates and ice machine water and sink
- Follow up:
 - No patients with active infection, none required treatment
 - o Pseudo-outbreak of *M. mucogenicum*

INVESTIGATION TEAM

- Infection Prevention
 - Mary Beth Graham, MD, IPAC Medical Director
 - Phil Gorecki – IP with pulmonology and respiratory therapy
 - Carrie Johnson – IP manager
 - Marie Kim – IP with sterile processing department
 - Jeffrey Senn – Enterprise facility services
- Microbiology
 - Haley Wozney
 - AFB staff
- WSLH
 - Sequencing

QUESTIONS?