Pseudo-outbreak of *Mycobacterium farcinogenes* in sputum cultures in the ICU at a VA Hospital

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Abstract

Background
In March of 2015, a pseudo-outbreak at a Veterans Administration Medical Center was discovered when 4 patients had *Mycobacterium farcinogenes senegalense* group (*M. farcinogenes*) growth from acid fast bacilli (AFB) sputum cultures obtained in the intensive care unit (ICU). A review of AFB cultures from the previous 2 years did not reveal any prior *M. farcinogenes. M. farcinogenes* belongs to the *Mycobacterium fortuitum* complex (fig. 1).

Methods
A case-control study was performed from January 1, 2015 – January 30, 2016. Cases were patients with sputum cultures positive for *M. farcinogenes*. Controls were age and gender matched 2:1 from patients with AFB sputum cultures collected. Data collected was age, sex, medical history, admitting symptoms, reason for sputum culture collection, use of nebulizer medications, oxygen requirements, procedures, location of sputum collection, and hospital days. An investigation of the environment and sputum collection process was performed. An epidemiology curve was constructed (fig. 2).

Results
Case-control
12 cases were identified. All cases had sputum collection while in the ICU and none had clinical disease attributed to *M. farcinogenes*. Odds ratio (OR) for nebulizer administration was 10 (95% CI 0.6, 166.56, p 0.11); OR for use of ipratropium bromide/albuterol sulfate (IPB/AS) via nebulizer was 4.2 (95% CI 0.25, 69.95, p 0.32), neither factor was statistically significant.

Investigation
No recent construction was performed or common staff identified. Cultures of ICU surfaces, water from the ice machine and sinks in case patient rooms, 3% saline solution used for sputum induction, and IPB/AS nebulizer solution had no mycobacterial growth. The manufacturer of the IPB/AS was contacted and denied other complaints or problems with sterility cultures. The mycobacterial lab switched diagnostic methods from high pressure liquid chromatography to matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF) approximately 6 months prior to the first culture with *M. farcinogenes*. Four *M. fortuitum* complex samples identified in sputum from 2012-2014 were re-run using MALDI-TOF and all samples were subsequently identified as *M. farcinogenes*.

Conclusion
No clear source of the pseudo-outbreak of *M. farcinogenes* was identified, other than the ICU itself. Further investigation into ICU environmental sources is warranted.

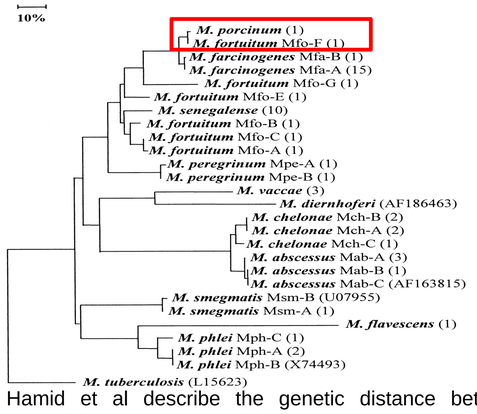
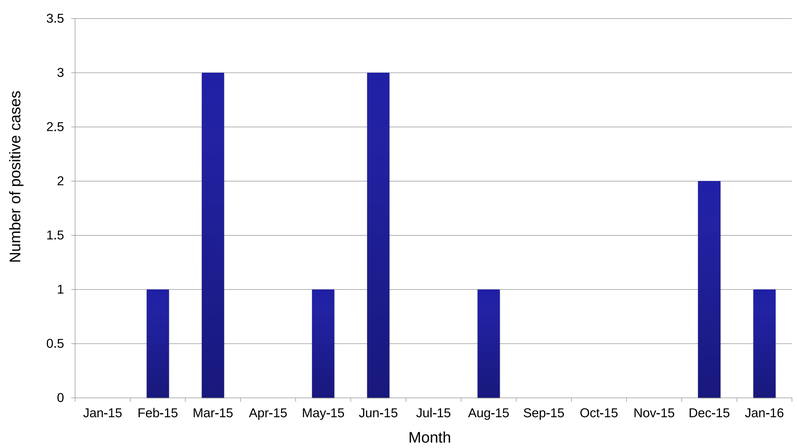


Figure 1: Hamid et al describe the genetic distance between *M. farcinogenes* and *M. senegalense* to *M. fortuitum* by sequencing the16S-23S internal transcribed spacer (ITS) region of mycobacterium rDNA.

Results

Figure 2: Number of sputum samples positive for *M. farcinogenes* by month.



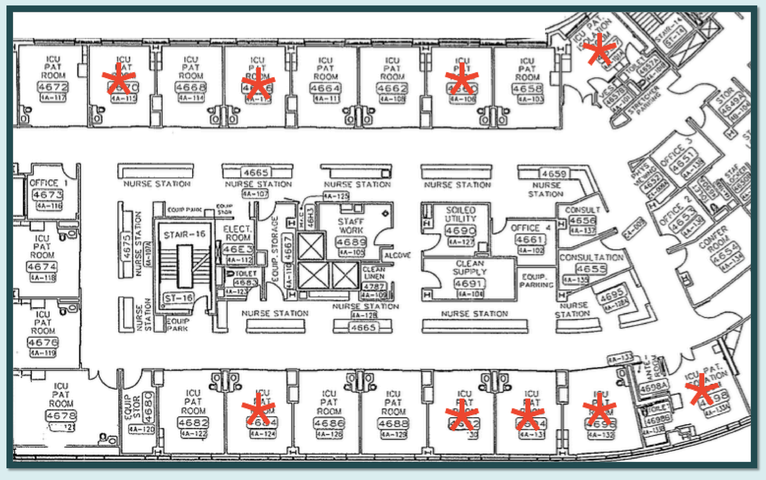
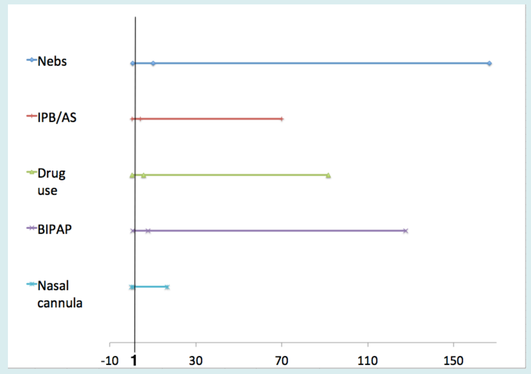


Figure 3: Jesse Brown VA Hospital medical intensive care unit layout location of *M. farcinogenes* pseudo-outbreak. A star marks each room affected. Some rooms had more than one case.

	Cases	Controls
Mean age	66	67.92
% with COPD	66.67	45.83
Median # of days hospitalized	9	6
Range # of days hospitalized	4-45	3-30 (in the control group, 46% of the cultures were obtained as outpatient)
Chief complaint		
% with hemoptysis	41,67	16.67
% with cough	33.33	41.67
% with SOB/dyspnea	33.33	20.83

Table 1: Various factors were analyzed to determine whether there was a true variation between positive cases for *M. farcinogenes* found in AFB sputum and control cases. Shortness of breath with hemoptysis was a common feature in both groups.

Figure 4: Odds ratio (OR) and Confidence Interval (CI) for factors studied. OR for nebulizer use was 10 (95% CI 0.6, 166.56, p 0.11); OR for use of ipratropium bromide/albuterol sulfate (IPB/AS) via nebulizer was 4.2 (95% CI 0.25, 69.95, p 0.32), neither factor was statistically significant.



Summary

- Nosocomial outbreaks caused by nontuberculous mycobacterium such as *M. farcinogenes* have been linked to contamination of potable water supply within hospitals.
- Very few cases of pulmonary infection due to *M. farcinogenes* have been documented in the literature.
- **Is this an old problem with a new name?** A change in diagnostic method from high pressure liquid chromatography to MALDI-TOF likely brought this organism to our attention. Four isolates of *M. fortuitum* from 2012-2014 were re-run with MALDI-TOF and identified as *M. farcinogenes-senegalense.*
- Further environmental studies in the ICU are being performed.
- None of the factors studied showed a statistically significant difference between the case and the control patients.

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