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ABSTRACT BOOK

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PS-95589-07 Comparison of five novel methods to detect tuberculosis cough aerosols in low-resource settings

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Background: As a disease that affects underserved populations, modern tuberculosis infection control strategies are usually out of reach where they are needed most. It is imperative that methods to identify the most infectious patients be developed so that infection control measures in low-resource settings can be executed in a targeted and cost-effective manner.

Methods: Patients were recruited from a shantytown near Lima, Peru after disease confirmation by sputum smear microscopy or chest X-ray. Five different low-cost aerosol collection methods were employed for direct cough inoculation and culture using selective agar or broth culture media. Common laboratory materials were used for each method, such as 24-well plates, Petri dishes, N95 masks, and disposable plastic bottles. Patients coughed 10 times into each apparatus before nurses transported the media to a laboratory for incubation. A questionnaire regarding patient symptoms was also administered at each visit. Analysis of bacterial colony counts and evaluation of sensitivity for each collection method were done in STATA 10.

Results: The broth-filled 24-well plate provides the highest sensitivity, 23.2% (95%CI 13.0–36.4), versus the lowest sensitivity, 8.9% (95%CI 3.0–19.6), seen with the 24-well agar plate or Petri dish cough plate. The cough chamber apparatus, made from plastic bottles, presented the highest collection efficiency with a mean of 11 042.0 (95%CI 10965.2–11121.0) colony-forming-units (CFUs). The mean CFUs for the 24-well broth plate was 1485.4 (95%CI 1464.5–1506.5).

Conclusion: It may be possible to identify the most infectious tuberculosis patients by innovatively using common laboratory materials to capture and culture cough aerosols. Future analyses must investigate how patient characteristics and symptoms are associated with infectious aerosol production, since this may shed new light on opportunities for infection control.

Comparison of Sputum Analyses and Novel Cough Aerosol Capture and Culture Methods: Detection of <i>M. tuberculosis</i> *						
Sputum Analyses		Five Cough Aerosol Capture and Collection Methods				
Z-N Smear Microscopy ^A	MODS Liquid Culture ^B	1 Agar Medium Well Plate	2 Broth Medium Well Plate	3 Plastic Cough Chamber	4 N95 Mask Culture	5 Agar Medium Petri Dish
2	1	0	1500	0	0	0
1	1	0	5000	2000	600	0
1	2	0	0	100	0	0
1	2	0	210	0	100	1000
3	1	1500	2000	38000	0	500
2	2	700	0	0	0	0
2	2	0	2400	12700	0	0
3	1	0	0	500	0	0
3	1	0	1500	0	2000	130
3	1	0	600	0	0	0
2	1	0	600	0	0	0
1	1	450	0	0	0	0
1	1	0	600	0	0	0
3	1	250	500	0	0	0
3	1	1550	2800	20400	13000	13000
3	1	0	0	0	900	0
3	1	0	400	3600	2000	900
3	1	0	1200	0	0	0

* Each row corresponds with a unique cough aerosol sample - Note: Cough aerosol columns contain CFU (colony forming units) counts from culture
A: 0, 1, 2 and 3 represent increasing bacterial load, based on bacilli/field
B: 0 = Negative, 1 = Positive, 2 = Positive Mono-resistant, 3 = Positive MDR